Nature Magazine

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APRIL 1941
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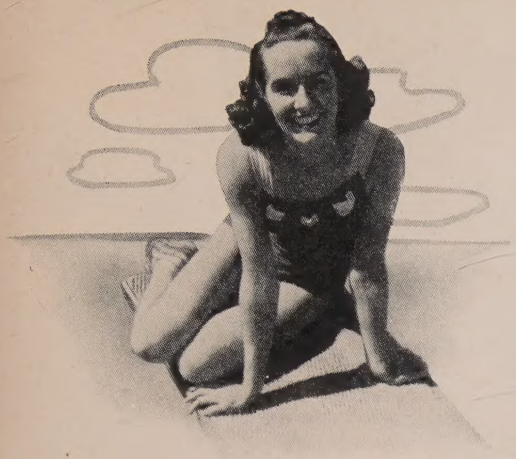

What state has more than 10,000 lakes?

ANSWER: Minnesota, with 11,007 lakes . . . and practically every one full of big fighting muskies, bass, pike, crappie or trout! Try your luck?

Q. What great American river system has its source and headwaters in Itasca State Park in Minnesota?

A. The Mississippi. The old Father of Waters is so insignificant at its source, it's fun to roll up your trousers and wade across it in half a dozen steps!

Q. The Northeastern part of Minnesota is called the Arrowhead Country. Do you know why?

A. Because it's shaped like a huge Indian arrowhead. However, if you keep your eyes open while you're tramping through the woods and around the lakes in Minnesota, you may even find a real arrowhead left there years ago by the Indians.

Q. Minnesota's State Parks, largest of which is Itasca with 32,000 acres, attract thousands of tourists every year. How many State Parks do you think there are in Minnesota?

A. 37 — with modern resorts and hotels at most of them to provide for vacationists. And in many of them you can ride or hike for hours over a network of trails through the virgin forests.

Q. Golf is one of the most popular sports in Minnesota. And to accommodate all the golfers, how many courses do you suppose there are in the state?

A. 60 in all. And there's enough variety to satisfy the most exacting pro or divot-digging dub. There's a course close to nearly every resort in the state.

Q. Thousands of non-resident fishing licenses are sold every year in Minnesota. Do you know what the cost per license is?

A. Only $3.00 — and a non-resident family license costs only $4.50! After you've tried a few days' fishing in Minnesota, you'll say you got more than your money's worth!

Q. You probably know that Minnesota produces more iron ore than any other state, but what else makes the iron mines famous?

A. Practically all the mining is "open pit" — not underground — because the ore is so close to the surface. At the big Hibbing mine, you can stand on platforms and watch mining operations in the biggest man-made hole in the world!

Q. Greatest inland port in the world is in Minnesota. Do you know what city that is?

A. Duluth, at the head of Lake Superior and the Great Lakes. You watch special loading devices pour ore and grain into boats headed for the east, and you see automobiles and coal unloaded from boats just arrived.

Q. The Official 1941 Minnesota Tourist Guide Book, crammed with pictures, facts and costs of Minnesota vacations will be sent to you as soon as you write for it. What will it cost you?

A. It's FREE—won't even cost you a box top! Send today for your copy of this 36-page book. Write to Dept. N4, Minnesota State Tourist Bureau, State Capitol, Saint Paul, Minnesota!

Camera Trails

BY NORRIS W. HARKNESS

TULIPS—AN HONORABLE MENTION PICTURE IN THE NOVEMBER, 1940, CONTEST. PHOTOGRAPHED BY GEORGE G. HYDE, NEW YORK CITY, WITH A GRAFLEX. SSS PAN. 1/5 SECOND AT F/22. #5 AGFA FILTER.

Tank Development

Tank development is the ideal method for the amateur photographer. The films are firmly held so that they cannot scratch each other, they are completely immersed in the solution throughout the entire operation, the tank is light-tight so that the development can be carried out in any light after the film is in the closed tank, and the method is adapted to the long timing of the fine grain development required for small films. Experienced workers who used large films could develop by inspection when their materials permitted safelights, but the modern films must be handled in absolute darkness and even old timers in the business cannot surely tell when the tiny films are right, so the one certain method for us is the tank.

Objectors remind us that different types of subject matter require different development for best results, but if we have exposed the negatives with the rough uniformity that the latitude of modern films permits, the standard development by "time and temperature" produces the best results in the long run. "Time and temperature" involves continuing the development for a length of time that depends on the temperature of the solution, and both these factors need to be accurately known. A good thermometer is necessary and, as in the case of other developing methods, the developer, hypo, rinse and wash ought to be as nearly as possible at the same temperature.

Probably the easiest way is to keep the developer, hypo and a gallon of water together in their bottles. Then the temperature of one is that of all, and we have only to determine from the chart the proper time for that temperature, and proceed with the process. Of course, when the room temperature is too high or low for the developer used, the solutions may be placed in a fairly large container of water at the required temperature and kept there until all of them give the right thermometer reading, and the tank may be kept in that water while the development is carried out.

But, granting that the temperatures are all correct, and that we know the time for it, one more element has a bearing on the negatives we shall obtain. This is the amount of agitation we give the tank during the development—and the more the tank is shaken the more contrasty will be the negatives. So it is important to standardize the agitation and keep the tank in motion in the same way, and for the same part of the whole time, every time we develop a film. Thirty seconds of agitation out of each two minutes of developing time is good, but will mean a longer time than constant agitation to give the same kind of negative, so work out your own plan and stick to it.

Roll film tanks are of two main kinds: one is made of bakelite and has two parallel discs with grooves into which the film slides, and the other is metal and has a catch for the end of the film that is fastened and then wound into grooves that hold each turn away from its neighbors. Either kind is loaded in total darkness and covered with its top, which is light-tight and yet allows the solutions to be poured in and out in daylight. A dark closet or a changing bag works well for the loading and any room will do for the actual development.

Making note of the time and perhaps writing down the time of the end of the development if your memory is poor, pour the developer into the tank as fast and as evenly as you can. Do not stop in the middle of the filling, for it will result in a streak across the films. Then agitate the tank according to your regular system until the time is up. It does not matter whether you begin the timing after the tank is full, or before you begin pouring, for you will vary the time given in the chart as your negatives are too contrasty or too flat, and the fact that it calls for fifteen minutes may mean fourteen or seventeen for your methods and preferences. When the development is complete, pour out the solution (maybe back into the bottle and perhaps into the sink) and pour in the hardening rinse if your developer calls for one. If it does not, a plain water rinse—at the same temperature as the developer, of course—poured into the tank and shaken around for a minute will protect the hypo and make it last longer. Follow this with the fixing bath in which the film will remain for fifteen minutes, and then wash it by allowing clean water to run into the tank through a hose. If water is scarce or runs too cold or warm, fill the tank with water from the gallon bottle, agitate it for a minute and after another minute empty the tank and refill it with clean water. Repeat this six times and your films will be clean. The cover of the tank does not need to be used after the fixing is complete.

Then comes the drying, a matter that spoils many films. If the place chosen to hang them is dusty, the emulsion becomes full of grit and dirt that ruins prints and cannot be removed. If it is too hot, the emulsion is likely to wrinkle, and if it is too cold the drying takes too long and the film may become grainy. The best place is in a corner where there is some movement of the air but not much dust. It should not be over a radiator or stove. For roll films there should be two clips; one to hold the film and the other to pull it straight. For the cut films, the spring clothes-pins work well to hang the films on a line.

But beware of water spots that come from letting the films dry with drops of free water on either side. A squeezed-out viscose sponge or chamois is the best thing to remove the free water after the films are hung up. Hold the bottom end in your hand and pull the sponge or a flat mat of the chamois slowly down each side. Be gentle, and be sure the sponge is clean of dirt or grit, to avoid longitudinal scratches. Careful wiping of the films will make them dry faster and with less danger of their being spoiled. Then, when they are dry, file them in glassine or paper envelopes—cellophane envelopes are not so good—and make sure they do not get scratched in your pocket.

That is all there is to it—but you will do better in the long run if you try to standardize the whole process. Work, if you can, at about the same temperature each time and agitate on the same schedule, and soon negative development will be the easiest part of the whole photographic process. Let me hear from you, if I can help you with your problem.

TRY A GARDEN SERIES

A series of pictures of any changing scene is likely to make a valuable addition to our photographic collection and one of the finest subjects is the life history of an individual plant, flower bed, or even a whole garden. We have mentioned this subject before but now is the ideal time to begin our own series.

If a single plant is to be our subject, we should plan the entire sequence in advance and see to it that all our shots are made from

the same spot with the same background arrangement. This might well involve driving a wooden peg into the ground near the plant, keeping in mind that our marker must be below the level of a possible lawn mower and far enough away from the plant to include all of it in our negative area when it is full-grown. Such a series may, of course, involve two viewpoints; one close to the plant for use during its very early stages and another, also plainly marked, to be used when the plant is too big for the first one. It often adds to the interest if we include in our picture area a footrule, or something else of obvious size that will show us the growth of the plant between shots.

If a flower bed is to be our subject, we might be wise to select two viewpoints, mark them clearly and make our entire series from each point. If we are more ambitious and wish to include the whole garden, we may need several viewpoints. The same procedure of marking and making each shot from the identical spots will add greatly to the actual value of our pictures. In any of these series we should remember that we are telling the entire life history of our subject and it should therefore begin perhaps as early as the last melting snow and follow through every stage from the planting to the final removal of the withered stalks. This will make an attractive series of pictures, and, if the shots are made at regular intervals of time, will not only show us the growth but also the exact times at which various varieties of flowers and plants are at their best. This information will often be of value in laying out our planting in future years, for it will enable us to keep our garden at its best for the longest possible time, as well as indicate preferable arrangements. Of course, we must keep a record of the date on which each shot is made if we are to get full advantage in this direction.

From a purely photographic standpoint, we shall find it interesting to note the time of year at which we get the best effects, and, if we are wise, we will include in the series a subordinate group of pictures taken throughout the same day at several intervals from earliest morning to sunset. This group will undoubtedly result in our learning by actual experience the fact which we have often been told, that late afternoon or early morning are the ideal times for outdoor pictures. On several occasions I have made such series of pictures. I only hope that your series is as interesting and helpful to you as Nature photographers as mine have been to me.

The Need of a Tripod

When you start into the field on a picture-making expedition, you are carrying the camera, meter, filters, and maybe some other gadgets that will contribute to your pictures, but too often the tripod is conspicuous by its absence. It is perfectly true that the tripod is a nuisance. It is bulky and ungainly to carry, and, if it is to be relied upon, it is rather heavy, but despite all this you need it.

In a few minutes you find a flower, an unusual fungus growth, or a bird's nest hidden in the grass. Without a tripod you approach the subject as closely as possible, trust that your view finder is seeing accurately the picture area that will be included on the film, and make the shot at the smallest

(Continued on page 181)

Trick Falls

Trail to Grinnell Lake

Glorious Glacier Park

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CAMERA TRAILS

(Continued from page 179)

aperture that will permit you to use a shutter speed that can be used with the camera in your hand. Often you have to stand on one ear and hold the camera at some awkward angle that makes your usually safe hand-held exposure far from certain. The resulting picture is not as sharp as it might be because the camera wiggled. A nice solution to the problem is a convenient fence post or a rock large enough to use as a camera support, but sometimes it is not entirely feasible to move either the fence or a half-ton boulder. Perhaps after all the tripod is not such a bad idea.

With it—and a tilting top of some sort is a very valuable accessory—the composition of the picture is a much simpler matter. You have a better chance to center the important material in front of your lens, and you can stop down the diaphragm as far as you please to increase the depth of field and insure a sharp picture without any danger of camera movement during the exposure.

"But," you say, "I can always make an exposure of 1/25th second without the slightest trace of movement in the negative." If you plan to make only contact prints or, at most, small enlargements, this may be entirely true, but if the amount the negative must be enlarged is considerable, there is a very real chance of enough motion to make the picture less satisfactory than it might have been. Here is a suggestion that may prove helpful.

Fasten to a wall a newspaper, or a large sheet of paper on which you have drawn lines in various places. If the minimum focusing distance of your equipment is too great, anything with sharp edges will make a satisfactory subject but it must be something that will not move. With the camera in your hand, focus sharply and make the exposure at the longest shutter speed you feel certain you can make with the camera perfectly still. Then set the camera on a sturdy tripod and make a second exposure with the same diaphragm opening and shutter speed. Develop the negatives together and then enlarge them both to the greatest magnification that you ordinarily use. When the prints are finished and dry, compare them for sharpness, detail, and quality. The chances are that you will find the tripod shot much superior in all three departments, and it may be that this simple test will show you the reason for some of your past failures.

This and That

Medo's Photo Supply Company, 15 West 47th Street, New York, offers at low prices some 500 Kodachrome slides on almost any subject you can name. They are 35 mm color pictures in 2" x 2" mounts for regular, small projectors, and you can fill in your collection with them. Write to Medo's for a list and mention this department.

The American Bolex Company, 155 East 44th Street, New York City, has announced the Knight metal letters for movie titles. They permit many different effects on a board slightly larger than you generally use. Get your information on the Knight letters and the entire Bolex line from the above.

Make-up makes the portrait. Most of your negatives are too small to be retouched even if you were an expert retoucher, but make-up will let you do the retouching on your subject without too much trouble on your part or hers. The Hampden Kit is available from the Raygram Corp., 425 Fourth Avenue, New York, at a low price. Write for their catalog of this and other supplies.

Burke and James, 223 West Madison Street, Chicago, Illinois, have added a swivel lens mount to their Solar enlarger line. The new mount is adaptable to most 3" or 3½" lenses and lets you correct distortion due to camera tilt with the aid of a slanting easel. Amusing distortion effects may also be obtained either with or without the slanted easel. Write for information on the mount and on their new Luxor foot switch. Don't forget to mention Camera Trails.

Fink-Roselieve, 109 West 64th Street, has announced spotting colors for black, white and the six Develochrome colors. Full information on the whole Fink-Roselieve line may be obtained from the above company.

The Kodak Ektra, latest addition to the Eastman line and first precision 35 mm camera to be made entirely in the U. S. A., seems to have everything a miniature camera could need. With the interchangeable backs that permit changing from one film to another without the loss of a single frame and lenses that work down to 18" from the camera plus many gadgets that are available only as accessories—if at all—in other cameras, the Ektra deserves the attention of any amateur who wants the best in a 35 mm camera. If your dealer doesn't carry the Ektra, write to Eastman Kodak Company, Rochester, New York, and mention us.

This department is operated for the benefit of the Nature photographers and maintains a service for their help. Its editor will be glad to assist you in solving your photographic problems and will welcome your suggestions and criticisms. Address your communication to Norris W. Harkness, Nature Magazine, 1214 Sixteenth Street, N.W., Washington, D. C.

Knowledge Seekers

In the Central High School in Tulsa, Oklahoma, the Nature Knowledge-Seekers Club is anxious to correspond and trade specimens with other similar groups in different parts of the United States. The organization has a wide range of interest in the Nature field. The secretary is Harold Dundee, and he suggests that correspondence be addressed to his home address, 1138 South Elgin Street, Tulsa, Oklahoma.

New Seal Exhibit

A bit of one of our northernmost possessions is reproduced at the Field Museum of Natural History in Chicago with the installation of a new habitat group showing bulls, cows and pup fur-seals on the rocks of the Pribilof Islands. This group, which is shown in the Hall of Marine Mammals, represents one of the most interesting conservation activities of the government, which protects and strictly regulates the harvesting of the seal crop. More than two million seals summer on the Pribilofs, and the annual kill is limited to 60,000.

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Many people who *should* be writing become awestruck by fabulous stories about millionaire authors and therefore give little thought to the $25, $50 and $100 or more that can often be earned for material that takes little time to write—stories, articles on business, fads, travel, sports, recipes, etc.—things that can easily be turned out in leisure hours, and often on the impulse of the moment.

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EACH CAN SAY

"I WAS A CLERK"

"I WAS A LINEMAN"

"I WAS A DRAFTSMAN"

THIRTY-SEVEN years ago, in 1904, the president of the American Telephone and Telegraph Company went to work as a clerk in one of the Bell System companies.

About that time, the 18 men who are now the presidents of the Bell telephone companies were starting their careers. For, like the head of the System, they have worked many years in the business — an average of 38 years each. Each of them can say: "I was a clerk," "I was a lineman," "I was a draftsman"— and so on.

The "know how" is here — for the every-day job of running the telephone business or to serve you in emergency. Up-from-the-ranks management is doubly important these days.

THE BELL SYSTEM IS DOING ITS PART IN THE COUNTRY'S PROGRAM OF NATIONAL DEFENSE.

BELL TELEPHONE SYSTEM

Nature in Print

By HOWARD ZAHNISER

THE British ornithologist Eliot Howard, in an interesting and highly informative book entitled *A Waterhen's Worlds**, illustrates "the striving of individuals in the spring, and its tragedy" with an account of his April observations of a male waterhen tempted by a "strange hen." Repeatedly the female courted the favors of the male in his own territory, and repeatedly the male, faithful (as we human beings would say) to his own mate, drove away the intruder. When he had driven her beyond the limits of his own territory, however, he responded to the strange hen's charms, but as they both returned to the home pond the male joined his mate in driving away the intruder. Yet the end of the tale is tragic for the faithful (as we human beings would say). After six days of domestic tranquillity, the male was faced not only by the strange hen, but with her a younger male that had come to fight. The former cock of the pond was vanquished.

"Head torn, feathers ruffled, one eye closed, lame—he limps and leaves. And as he leaves he lingers and looks behind. . . . The strange hen with her mate owns the pond."

This incident, obviously difficult to re-tell briefly without giving the almost inescapable suggestion of the familiar human eternal triangle, is only one example of the wealth of interest that comes from such intimate observations as Mr. Howard has made and recorded. His deductions and conclusions, philosophical and psychological, are no less fascinating, although, central in his interest as they are, they make his volume something far more weighty than a popular account of bird behavior. The waterhen's worlds are four—territory, sexual, platform, and family. "For two months, day by day, or hourly, or even minute by minute, the waterhen shifts from one world to another." No one who travels through these worlds with Mr. Howard can fail to have a nicer appreciation of the peculiar character of the various and particular species that share our own earthly world.

In a most sensitively beautiful work of prose fiction that is poetry in all but its disregard of prosody, Judy Van der Veer, on the other hand, recalls or creates the experiences of a girl who lives in a farm or ranch world of California, and does it with such a delicate sense of living things that the impression, for some reason or other, is somewhat similar to that of Mr. Howard's treatise. Yet the theme of this book, called *November Grass,* is at the opposite extreme, perhaps one of the extremes that meet. After the tragedy of the girl's life, "she began to cry, and her tears were not all sorrow" for herself and her lover. "She cried for the strange beauty of the silent things on earth . . . for all who must live. . . . All winds are one wind, she thought, and all lives are one life. She knew why she trembled for hunted deer, why she grieved for calves and felt pity for young foals." Perhaps the common impression of these two widely different books results from the sympathy (that is, the sharing of life—not sorrowing) that results from watching Mr. Howard's waterhens intently or participating in the universal companionship of Judy Van der Veer's "girl"—the unnamed heroine of *November Grass.*

It is easy, of course, to appreciate Judy Van der Veer's work of fiction rightly and apprehend its theme, because she is helping us to see better with our own eyes our own world. It is difficult, however, to follow Mr. Howard faithfully into a waterhen's world, although certainly that would be an ideal way to understand other creatures, because after all our most excellent minds still lack the power to be poorer minds, even for the purpose of appreciating a waterhen. Perhaps the central difference, in this connection, is indicated in Mr. Howard's conclusion that the waterhen has no power to reflect. "Having no power to reflect," says Mr. Howard, "he perceives no self: memories he has, but perceiving no self he has neither future nor past—and so, no time. His world is always in the present, and mostly full of joy."

It requires only a slight exercise of this human power of reflection to realize how little we live in the present and how much in the past or the future, the unconsciousness of which is the fullness of joy for the waterhen. Vaughan Cornish's small book on *The Scenery of Sidmouth: Its Natural Beauty and Historic Interest* is an excellent recent example of our human efforts not only to remember but to make future remembrances of the past inescapable. Those who find all accounts of rivers, countrysides, and scenery interesting or diverting and, of course, those particularly interested in the Sid and Sidmouth, will find Mr. Cornish's book of intrinsic merit. Still others, however, will find it significant as an example of efforts that they would like to see duplicated in their own valleys or regions.

Dirk, the friend of the girl of *November Grass,* reminded her: "The ocean is one thing that people can't harm. They can cross it in ships, or fly over it, but they can't leave any lasting impression on it." Certainly man's threats cover the land and even sometimes at least encroach on the sea. "The cliffs of England and their outlook on the ocean are a precious heritage of the Nation's scenery," says Mr. Cornish, and in the next sentence points out that "with the increase of motoring and the multiplication of villas and bungalows there is thrust upon (Continued on page 232)

*Books discussed in this article are:

A Waterhen's Worlds. By Eliot Howard. Cambridge: The University Press. New York: The Macmillan Company. 1940. 84 pp., with 2 plates and index. $2.50.

November Grass. By Judy Van der Veer. New York and Toronto: Longmans, Green and Co. 1940. 246 pp. $2.

The Scenery of Sidmouth: Its Natural Beauty and Historic Interest. By Vaughan Cornish, D. Sc. Cambridge: The University Press. New York: The Macmillan Company. 1940. 86 pp. with index and 6 illustrations, including large panorama sketch of Sidmouth in 1815 (in folder). $2.

The Delaware. By Harry Emerson Wildes. New York and Toronto: Farrar & Rinehart. 1940. 398 pp. with index, bibliography, and illustrations by Irwin D. Hoffman. $2.50.

The Arkansas. By Clyde Brion Davis. New York and Toronto: Farrar & Rinehart. 1940. 340 pp., with index, bibliography, and illustrations by Donald McKay. $2.50.

"... THE MARSHLAND MOTHER QUICKLY LED HER DOWNY FLEET INTO THE FARTHERMOST ARM OF THE POND."

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Meetings in the Marshlands

By JOHN LINDSEY BLACKFORD

Illustrated by R. Bruce Horsfall

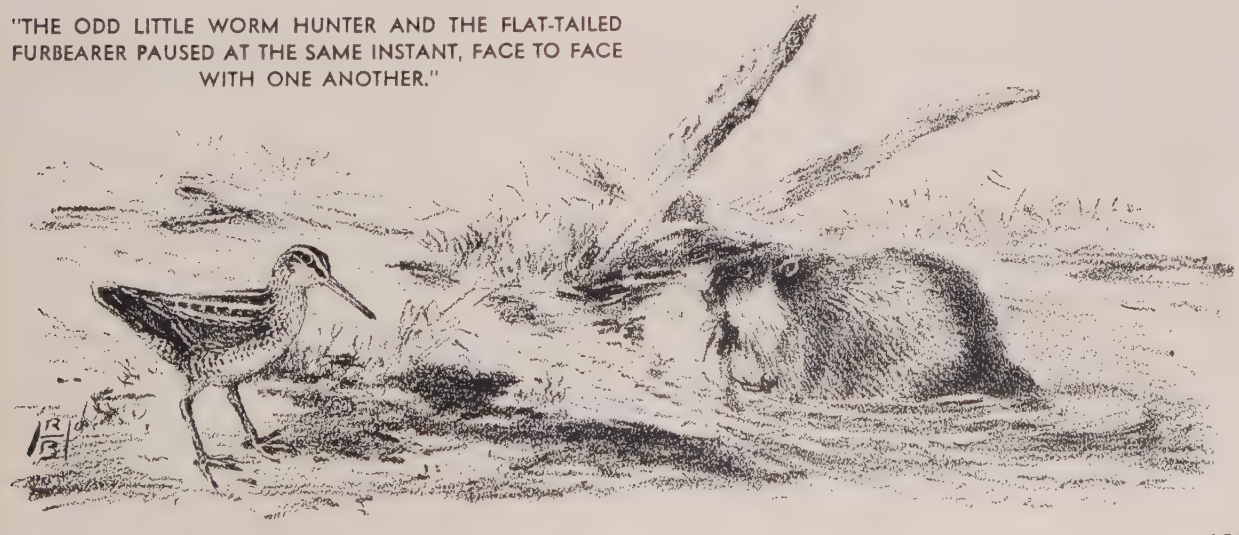
THE marshlands—they are the very symbol of secrecy in Nature, the abode of her deepest mysteries. As the home of fabulous beast and bird, the abiding place of phantom and will-o-the-wisp, swamps have always fascinated mankind. While we no longer clothe them with dark romance, or entertain a vague fear of them, the mazes of tule and cattail still hold unmeasured store of adventure.

A distinctive citizenry inhabits the marsh. It is a life pattern strangely different from those upon nearby land and open water. And even more than the deep forest, the fen has been a refuge for the hunted. Within its miry borders, amid its fast-growing luxuriance, life finds haven and multiplies apace.

Drifting along secret channels, down the green alleyways of the reeds, we surprise many a shy marshland dweller. A mink vanishes furtively within the green tangle. A bittern sways in unison with the waving blades. A swimming muskrat divides the quiet surface of the amber waters. Other inhabitants, more voluble or less secretive, accompany the intruder or mark his course. A sora, never seen, calls constant warning only a few feet away. A marsh wren forgets his ditty and scolds vociferously. Overhead the redwings pipe, and from a bending, saffron-colored stalk a yellow-headed blackbird voices his ridiculous love-cry.

Happenings that disclose the ways and character of wildfolk seem to occur more frequently here. Meeting a mallard in the marshes one morning taught me how largely wild things may be the children of instinct. I flushed the bird among rank grasses, and at once its behavior betrayed a difference from its kind. Other waterfowl sped far off toward the tules; this duck flew low and dropped into short cover no more than forty feet away. It was late July. Since the mallard could have no nest, it appeared as though its brief flight must be

"THE ODD LITTLE WORM HUNTER AND THE FLAT-TAILED FURBEARER PAUSED AT THE SAME INSTANT, FACE TO FACE WITH ONE ANOTHER."



the result of injury. Possibly it had escaped some hunter, and never since recovered full strength on the wing.

Mentally I marked the spot of its concealment and after a moment's search located the refugee. It crouched in a little runway between small clumps of sedge. The fact that the mallard remained motionless, although but eight feet away, suggested that I discover how persistently it would maintain this ruse. "Freezing" is a characteristic of many wildings and this lone waterfowl was adept in its use. Casually I passed near the tussock that barely concealed a feather of the courageous bird. Then I returned upon the other side. Gradually the distance narrowed. Occasionally I paused, and still the crouching duck did not betray its presence there on the watery grassland. At last I was standing beside it, one boot an inch or two from its breast. I could imagine with what uncontrollable throbbing the wild heart beat within that still form.

How far might the age-old forces of self preservation guide this crippled waterfowl in an emergency? I bent over and lowered my hand over it. Finally my fingers touched the mallard's back. The strong instincts that had developed the "freezing" habit within its race ruled it so powerfully that the mallard was brought directly into the way of danger rather than being delivered from it.

Fearing to pursue the experiment too rapidly, I moved away, then back past the sedge clump upon the opposite side. Again I stood over the motionless habitant of the marsh, and once more stooped to lay a hand on the duck. But the continued tension proved too great. With a frightened quack it sprang up and winged frantically for two rods into denser cover that grew in several inches of water. As the bird paddled into the ranker growth, its course was at first readily traceable by the moving stems.

This sedge-grown pool was not large, and with the mallard's course disclosed, I marked the last movement in the grasses with some indifference. Wading in, I searched more carefully. I circled about the spot, examining with increasing care every retreat or cover in which the duck might have hidden. At last, striding back and forth, I splashed heedlessly about in high boots, but without success. The same instinct, which a moment before had betrayed the crippled bird almost into my hand, now foiled a second discovery as completely as it had facilitated the first.

A mother bufflehead, on the other hand, demonstrated how clever and sagacious a marsh dweller may be. I came upon the butterball and her babes in a small, swampy, upland pond, perhaps a hundred and fifty feet in length. The reed-grown pool quite accurately had the shape of the letter T. This fact might readily be seen, but its significance was not yet apparent. Hastening down into the watery, green swale to get a close-up of the little family, I formed my plan at once. An approach to the central area upon the left side of the lakelet would cause the solicitous mother to lead her ducklings into the farther stretch for greater safety; then a quick circuit of the base of the T and I should be able to isolate the bufflehead brood at the far end of the upper right arm. To return they must pass back along its narrow course, and on its reedy margin I should watch the little flotilla as it paraded by, hugging the opposite bank a few yards away. It would make a fine picture.

As scheduled the marshland mother quickly led her downy fleet into the farthermost arm of the pond. Unlike waterfowl on open water, however, she seemed not intent on putting the greatest possible distance between us. Warily she rode with her brood scarcely more than half way down that farther channel. A hurried circuit of the base of the T quickly substantiated my growing doubts as to the success of the plan. Before they could be cut off, the butterball turned and escorted her charges back to the juncture of the three embayments; then she leisurely ushered them down the opposite stretch, this time the left arm of the lakelet.

No stratagem I devised succeeded in driving her more than half way along its shores. Although I next skirted the shortest of the three lanes of water, I again failed to cut her off from the other channels. Plainly she had perceived her danger at the start, and the little game I had been playing was won by the alert mother before it had well begun.

The flora of the marsh is picturesque, and often beautiful. Cattails raise their lush ranks each season. Beyond, across the black water, stand the waving, dark green walls of the giant bulrushes. The rough white water crowfoot extends its aquatic mazes offshore, while duckweed, smallest of flowering plants, floats free upon the surface, matting it greenly. The scalloped border of a pond lily zone, with black terns dipping and crying above and the shimmering blue sheet rippling beyond, is reviving even in memory. Even the stagnant, algae-grown pools are not devoid of interest.

The rapidity with which wildlife returns to former haunts is never better illustrated than in the restoration of marshlands. On an afternoon in the Centennial Valley of southwestern Montana, where a sanctuary had been established three years before, I had opportunity to observe the furred and feathered population of a newly reclaimed area. From this particular spot, which had suffered the usual overgrazing, deserted cabins and ranch buildings had not as yet been removed.

The last days of July were at hand. With each clear, hot afternoon a thunder shower gathered darkly and moved up the valley. Passing over the beauteous lakeland, the disturbance would continue on over Red Rock Pass. The blue of cerulean lakes would change to match the darkening clouds, and rain curtains swept their gray sur-

TWILIGHT IN THE MARSHES

BY EMMA GLASER

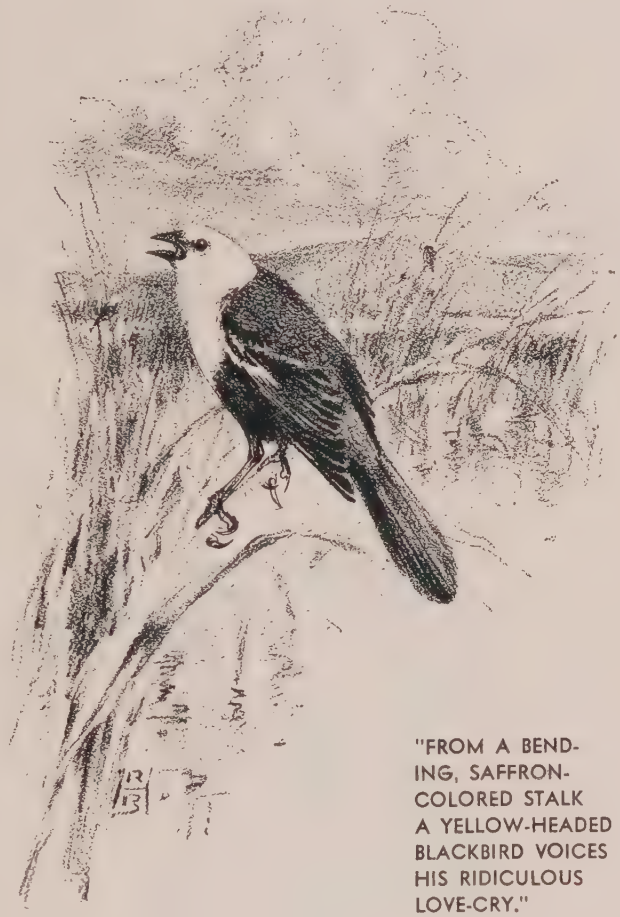
Have you ever walked at twilight
Down beside a broad swale's rim,
Heard marsh voices all about you
While all other sounds were dim?

Teeming life stirs in the sedges
Where no human foot has trod;
But a stillness fills your being
That is like the touch of God.

faces like successive battalions of the advancing storm.

Watching the sullen thunderheads now rolling up the valley, I should have recalled that all wild things respond to these minor convulsions of Nature; but I could see in the threatening rain only a hindrance to my more immediate intentions. That tense, electric feeling that precedes such a crisis was prevalent in the air. The swallows began to weave and circle, to lift and fall before the rising gusts. Violet lightning played above the gray waters and thunder reverberated from the southerly ranges. Moving sheets of rain obscured the long, green tule islands of Lower Red Rock Lake. Now the barn, eaves, and tree swallows were riding the blasts. Entire flights would mount the gale. Driven low again they were dispersed in speeding, scattered groups down wind. It was a stirring sight to see them regain and hold their former positions.

At first the rain came upon the gusts like mere driven spray, but after a brief lull a lashing shower proved the strength of the storm. I had found comparative dryness beneath the broad eaves of the low log barn. The downpour had dampened the swallows. While some flew in beneath the roof, many still sat out the final drizzles upon rails of the old fence or gathered on a rickety hayrack in the deserted barn lot.



"FROM A BENDING, SAFFRON-COLORED STALK A YELLOW-HEADED BLACKBIRD VOICES HIS RIDICULOUS LOVE-CRY."

The nerves of all wild things had seemed tensed and tightly drawn at the commencement of the storm. Now all appeared joyous and relaxed. Intermittently a cooling rain replaced the former oppressive heat; for its duration both birds and mammals joined in the universal relaxation of Nature. It was of this intimate scene that I became a witness.

Seldom do we see the Wilson snipe save when he bursts momentarily from cover. Yet the bird I now saw was walking quietly about on the earth-covered roof of a root cellar ten yards away. He preened his bedraggled feathering and then made his way over the eaves to the front of the building, apparently to study his observer. I had slipped along the side of the barn, keeping close against the logs. Strangely, this disturbed him little. His attention was soon diverted by a sparrow that alighted near the comb of the sagging roof. He seemed to resent its presence for he climbed the gable and crowded the newcomer off.

Before me, at ten or twelve paces, a marshy stream crossed a corner of the old barnyard and, flowing out toward the lake, widened and shallowed in its sedge-grown course before sluggishly emptying itself there. Only at the corner of the lot, where the spreading creek flowed under the rotting rails of the fence, might its blackish current be seen running free of the swampy vegetation. Presently the snipe flew across the lot, and partially screened by tall grasses began moving upstream. More shadow-like than any snipe, a sora appeared. Forsaking its green runways, it came out into the open to search the muddy bank of the creek channel. The snipe, thirty feet from me, busied himself with probing in the soft ooze almost to his eyes. Two channels joined just beneath the old fence. As the jack snipe, occupied with his probing, approached their confluence, a beaver suddenly appeared, his mouth full of dead cattail stems. The odd little worm hunter and the flat-tailed furbearer paused at the same instant, face to face with each other. Neither moved; both were silent. At last the snipe resumed his probing, four feet distant from the beaver. The latter turned and waddled up the farther streamlet. Each wild thing apparently understood the other. I had noticed no work of beavers about the marsh and the large rodent's sudden appearance with his curious load was surprising.

Savannah and white-crowned sparrows joined the swallows on the old hayrack. The swallows were leaving and returning now, circling and weaving overhead as they had done with the coming of the strong wind.

Meditating on how the storm increased the tolerance of the marsh folk for one another, even bringing some together as companions, I was yet unprepared for the friendly confidence one of them now displayed in me. The snipe, on ground that would have been perilous for him a few months before, ended his investigations and turned from the swampy creek. Eyeing me interestedly, he advanced through the low weeds of the barn lot. When he had come within six feet I lowered my binoculars. Another foot and he was out of focus. There he was, curiously confident, looking up at me, studying this strange comrade of the storm, while I, with eight-power glasses, watched a most elusive marsh snipe, too near to

need or make use of them! It was a revealing experience.

After scrutinizing me a while with large, bright orbs, he strode off toward the left. Not far away, he stood in the open and dressed his plumage for the next quarter of an hour. The sora came again like masked silence from the mazes of the marsh. Once more I caught a glimpse of the beaver. The swallows were leaving the low barn, darting out through the nearby frameless opening. The stormwrack was retreating over the pass.

Without warning the snipe appeared suddenly to explode, darting and diving in hurtling flight into the taller sedges. A second bird, not seen before, simultaneously did likewise. Sparrows and swallows left the hay frame. Looking quickly about, then up, I saw a great harrier sweeping low over us. The spell had been broken. For a space the lakeland of Red Rock had revealed itself in one of its most subtle moods. Now, the marsh was again the wild.

Perhaps the thrill today is a great sandhill crane springing from the nest where she lay flattened with long neck stretched upon the matted reeds; or the supreme moment may come with the majestic wheel of snowy pelicans whitely cleaving the blue. Certain it is that as we increasingly take inspiration from Nature, as we seek out her deeper secrets, we shall turn ever more often to the regions of bog and fen. In these watery haunts of heron and grebe, muskrat, and mink, there waits experience and adventure encountered in no other dominion of the wild.

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The Black Cockatoo

By EDITH M. LAING

Of the six hundred or so species of psittacine birds, about twenty comprise the cockatoos, their particular specialty being a head crest that can be raised at will.

Cockatoos are found only in Australia and the Malay Archipelago, with one species occurring in the Philippines. Beautiful as they are, the farmers bear them no love, for flocks are too ready to raid the orchards and young grain.

Most of the affectionate and amusing cockatoo pets we know are plumaged in white combined with delicate shades of rose or lemon, or in pale gray and rose. Not so well known are the dusky-hued ones.

To identify accurately the handsome fellow on North Borneo's two-cent stamp I consulted Karl L. Koch, long in charge of birds at the San Diego Zoo. He not only recognized him right away as the so-called black cockatoo, *Microglossus aterrimus,* but led me to a great outdoor cage where perched a pair of these birds.

Both male and female are identical in coloring, the female being only slightly smaller. The whole plumage is a dark, thundercloud gray, strikingly set off by cheek patches of vivid persimmon red. This bare skin begins below the eyes, extends around the base of the lower mandible, and continues in a curious form beneath the upper mandible clear across the mouth. This latter peculiarity reminds one of an old person's toothless gum. In the persimmon-red interior of the mouth is a lively persimmon tongue, black and horny on the tip.

The great sharp-hooked beak, matching the feathers in color, is ingeniously adapted to cope with the extremely hard-shelled nuts that form the bird's chief natural food. Between the sides of upper and lower mandibles is a considerable gap. The scoop-shaped lower one is notched at the side edges, and the front edge raised to fit into a wide notch below the upper mandible. To observe this combination saw and nut-cracker to advantage one must either see the birds, or else consult the close-up illustration of a head, as in Wallace's "Malay Archipelago."

The beautiful crest is made of long narrow plumes, gracefully waving and feathery when erected, in contrast with the stiff effect of many other cockatoo crests. Legs and feet are the same dark slaty gray.

Mr. Koch told me that although it is difficult to accustom the black cockatoo to cage life, this particular pair is happy and thriving on sunflower seeds, nuts, oranges, apples and bananas.

My visit being at the time of the courting season in their homeland, the male was busy trying to attract his loved one's attention. After ostentatiously sharpening and polishing his imposing beak on the perch he nudged her with his shoulder. No response. He threw forward his wonderful crest, bent down and looked knowingly up into her dark, bright eyes, murmuring soft clucking notes. Still no response. Then drawing himself up, he raised one foot, thought a moment, then simultaneously stamped the foot down, threw his crested head forward and up into her face with a loud and hearty "AH!—ha-ha-ha-HA!" It was exactly the same idea as a man slapping his thigh to emphasize a mighty laugh. However, the lady preserved her imperturbable calm, only once quietly raising a foot, as though to say: "That will do, James! Run along now!" But the persistent wooer was still going through his unappreciated routine when I left at the end of an hour.

The black cockatoo ranges from the extreme north of Australia to New Guinea and Borneo, and in some places is called the palm cockatoo because it often feeds on the succulent heart of the palm cabbage, native in these regions.

MUHLENBERG'S TURTLE IS ONE OF THE RARER OF OUR EASTERN SPECIES

Its life history was long a mystery, although many of the details are now known. It was discovered by a Pennsylvania clergyman, with a love of natural history, and named for him

Little Turtle of the Swamp

By W. STUART CRAMER

He is not even four inches long when full grown. His shell is dark brown, usually without any variation. His legs and head are unmarked; but on his neck, behind his eyes, are a pair of bright orange spots that stand out like two chrome-colored toadstools in a spot of sunlight against a dark background.

Upon a bed of pebbles of quartzites and other silicates a hillside spring may have deposited many feet of thick ooze to form a small bog. Such is the home of one of the rarer turtles of eastern North America. Zoologists call him *Clemmys muhlenbergii.* We will call him Muhlenberg's turtle.

At the very end of the eighteenth century Reverend Muhlenberg, a clergyman with natural history as a hobby, began to find in the small swamps of Lancaster County, Pennsylvania, this interesting but hitherto unknown member of the hard-shelled tribe. His specimens were presented to Dr. Schoepff, who first described them in his *Historia Testudinum,* published in the year 1801, as *Testudo muhlenbergii.* The genus *Testudo* was in those days as broad a group of turtles as *Coluber* was of snakes. Consequently we find that many of the numerous genera now recognized trace their origins to one or two groups now antiquated. Schoepff mistook Muhlenberg's turtle for a variety of box turtle, and it was not until 1835 that it was placed in its present genus, *Clemmys,* which, in the East, includes the wood turtle and the spotted turtle.

Since the year of its discovery the life history of Muhlenberg's turtle has remained a mystery. It was even held that it laid its eggs on hillsides, a guess based on the fact that the box turtle, numerous in the same localities, has this tendency. While some details remain still to be worked out, much of the mystery surrounding Muhlenberg's turtle has been cleared.

This little turtle may be said to be locally abundant in eastern Pennsylvania, southern New York and New Jersey. Its range extends from this region north to Lakes George, Ontario and Erie, and thence from Rhode Island southward through Virginia to the mountains of North Carolina, where it may be said to be numerous in some localities.

The little turtle with the orange ear spots makes his winter bed beneath the frost line and does not appear until late in the spring. Not until after the first painted turtle has come out, and many of the spring flowers have bloomed and gone, do Mr. and Mrs. Muhlenbergii step out to see what the long cold winter has done to their swamp. The female seems to be content at this time to lie in the running spring water beneath a thick patch of swamp grass. The males, however, can be found wandering about, some of them even out of the swamp. If the day is hot, the females may be perched upon a clump of dry grass from the year before, sunning themselves. Also at this time, it is possible to find young specimens, just hatched.

This is the courting season for Muhlenberg's turtle. There can be little doubt that they need not mate each year, but that one mating will last for several years. In the swamps of eastern Pennsylvania the females outnumber the males, in what proportion it is hard to say. They often

remain secluded, and the males must search for their mates, indicating that Mrs. Muhlenbergii is not proposed to every year.

The courtship is an interesting one. The males are almost savage as they snap at and bite the feet of their mates, or of any male that happens to approach too closely. The whole affair, an elaborate one, can be observed in an aquarium containing about one and a half inches of water. During a part of the ceremony the male literally "breathes in" water through his mouth and forces it out through his nostrils. At the same time he beats a light tattoo on the shell of his mate with his own shell, this being his way of telling her of his affections.

Some time in June the female turtle lays her eggs. She finds a particularly nice-looking patch of green sphagnum moss three or four inches above the surface of the water in the swamp. With her hind legs she parts the long soft stems of moss and deposits from three to six—sometimes seven—eggs. These are oval-shaped and are covered with a leathery shell similar to the shell of a snapper egg. They are almost pure white. She covers these eggs carefully with the surrounding sphagnum, and leaves them to incubate in the warm, damp, absorbent moss.

THE UNDER SIDE OF THE TURTLE

There is relatively little color pattern on the under shell of this little dweller of the swampy places

Toward the end of September the young are usually ready to hatch, although often they do not hatch until the following spring. Inside the shell is a tiny turtle with one hereditary impulse—an ambition to see the outside world. So, slowly, the baby turtle turns his head from side to side, pushing against the wall of his prison.

Here is where Nature has come to the aid of another of her subjects. A chick is supplied with a hard growth on its bill with which it can puncture the egg shell, but snakes and turtles are not. They are given a comparable apparatus in the form of a sharp-pointed growth that we call an egg tooth. This "tooth" is situated on the upper mandible between the cutting edge and the nostrils. It is used only to cut open the egg shell and is usually absorbed within a week or ten days, although egg teeth have been known to remain for longer periods.

After a good-sized slit has been cut in the side of the shell, the baby turtle, not without some effort, pushes one foot through the opening; then another. After a while a blinking-eyed head appears. Finally, with a supreme effort, a little thing not much bigger than a June bug emerges. It has a very soft shell and is still relatively helpless.

The young turtles, as they grow older, are marked on the shell with concentric grooves or rings. Each one of these on a scale, or scute, marks a year of growth. This enables us to tell the age of young specimens, but as they grow older the grooves are inclined to disappear, until, at last, the shell is quite smooth. Even these older examples seldom reach four inches in length and the orange spots on the sides of the head are darkened, but rarely to obscurity.

Muhlenberg turtles become excellent pets after a few days in captivity. They require some water, enough to cover them, and a small rock or similar place upon which they can climb to dry. I had a half-grown one—which we called "Muley"—in a ten-gallon aquarium for more than a year before I released it. It soon became so tame that it looked forward with eagerness to our approach, always on the alert to take raw beef or hamburger from our fingers. But familiarity breeds contempt, and after a year it knew us so well that it never bothered to differentiate between hamburger and finger.

Many former habitats of this little turtle of the swamps have been filled in or cleared, and much more such "progress" will follow. But we who are conservation-minded have a consolation—that the amateur will always find it hard to collect our little friend unless he is willing to penetrate the deepest parts of the bogs in which he of the orange ear spots resides, and only on the hottest days.

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THE PEEPERS

By WADE VAN DORE

The tiny peepers, bubbling at the throat,
Contrive to make loud song on one shrill note.
It may be hard for them, but when they stop,
We can be sure of next year's peeper crop.

A MOTHER MARSH HAWK ON HER NEST
Getting this picture of a brooding bird was no small feat because the father bird swooped courageously and violently in protest, and warned his mate

A Story of Marsh Hawks

By ENOCH REINDAHL

Photographs by the Author

THE ground beneath the rank growth of marsh vegetation was still frozen, but the early spring sun felt warm. I was inclined to day-dream, and the bird that I watched seemed to be ascending an invisible circular stairway as it spiraled upward with hardly a wing-beat. Suddenly, coming to the end of the stairway and unable to stop in time, the bird tumbled off into space.

I was not day-dreaming now, but much interested, for the bird was a marsh hawk, and this was the beginning of one of those fantastic courtship performances peculiar to this species. As though it had lost its power of flight, and was trying desperately to regain it, the hawk tumbled downward, twisting and turning this way and that. Dropping twenty—possibly thirty—feet, it finally came out of its fall in an abrupt swoop that carried it sharply upward. Its momentum spent, the bird looped over in a back somersault, then down in another dizzy spin—up and down, up and down, tirelessly, and with an almost monotonous regularity. I had witnessed these strange performances on other occasions, sometimes staged quite high in the air, often so low that each downward plunge left me breathless for fear that the bird would crash into the marsh, and I knew that the hawk was showing off, trying to win the favor of his desired mate—a real exhibitionist in so doing.

A FLEDGLING OF THE MARSH HAWK FAMILY

The baby birds would open their mouths as a protesting gesture when quite young, but their chief defensive weapons were their sharp claws, which they could use with surprising accuracy and effect

When I again visited the big marsh the ground had become soft underfoot, and the drab, dead vegetation was giving way to the fresh green of new growth. The hawks were nesting. A watchful male, seeing me enter what he felt was his private domain, began a determined attempt to drive me away. His antics, however, only served to show whether I was "warm" or "cold" in my search for the nest, which obviously was nearby. Finally the female, slightly larger than her blue-gray mate, with her brownish plumage more conspicuously barred, arose from the weeds, revealing the nest with its eight white eggs—an unusually large number. The male continued his offensive until I left the vicinity of the nest, finally joining his mate, who was soaring high overhead.

I had gone on for several hundred yards when, to my surprise, the same male swooped down in a long glide that terminated just short of my head. With renewed fury he tried to impress me with the fact that my presence was not desired. Mystified by this new assault, I was even more puzzled when another female flushed from a nest in which were five eggs. Later visits to these and other nests in the area convinced me that this particular male had mated with both females. Besides being a bigamist, this marsh hawk was unusual in other ways. Always more alert, he was also far more aggressive than the other local males in his efforts to drive intruders away.

Equally fearless, however, was a female that reared a family of four young in an adjacent meadow. She had evidently lost her mate, because no concerned male made his appearance when I approached the nest, nor did I ever see any but the mother bird bring food to the young. Often, when I ventured too near the nest, and especially when I was not watching her, she would swoop down and strike the top of my head with lowered talons.

Making the rounds one day, after an absence of about two weeks, I found that the hawk with the eight eggs was not on her nest. The eggs were cold, and her mate, who sometimes had knocked off my hat with the viciousness of his attacks, now seemed only half-hearted in protest. Walking on, I thought perhaps a fire, which had recently burned through a nearby strip of marsh, had caused the bird to abandon her nest. I had not gone far when the male, who had been keeping close watch of my movements, suddenly began attacking with such savageness that I was forced to duck. Almost simultaneously the missing female, easily identified by the ragged appearance of certain wing feathers, and her peculiar cry—much like that of the flicker—arose from a new nest in which she had laid four eggs. Later, I broke some of the eggs in the abandoned nest, and, although having been incubated for several weeks, they showed no sign of having been fertile. The second nesting venture of this hawk subsequently proved to be successful. What circumstances, then, resulted in the first failure? And what special provisions of Nature enabled the bird to lay more eggs on short notice?

Although I had not previously visited the area burned by the recent marsh fire, I knew that a pair of hawks had been nesting there. Because of the new growth of grass

MALE MARSH HAWK ON THE WING

This is the bird the author describes as having two mates and two families to defend, which he did effectively with his power dives and swooping flight

the flames had not made a clean sweep, and setting out to investigate, I hoped that the nest might be safe in one of the unburned patches. No angry cries of marsh hawk greeted my approach, however, and I was quite certain of what had happened even before I found the charred mound and the fire-blackened eggs. This pair of hawks, I am sure, established a new nest in another part of the marsh, for, later in the summer, four fledglings were found that had, for some reason, gotten a comparatively late start in life.

One day my entrance into the marsh was accomplished without creating the usual disturbance. The original male, whose solicitude for his two mates seemed increased rather than lessened by his two-fold responsibilities, was evidently off on a hunt, and his favorite perch on an old fence post was now occupied by a bobolink, whose notes of alarm were muffled somewhat by a bill full of green caterpillars. Selecting a place where the tall grass offered concealment as well as partial shade from the hot sun, I sat down to watch. Without revealing the location of the recipients of the worms and insects that it brought, the bobolink had come and gone

A few hours old, the baby hawk at the left is barely able to hold up its head

A belligerent nestful and, below, the same hawks older and in even more combative mood

several times, when the quiet was broken by the cry of a female marsh hawk. It was not a cry of anger at an unwelcome intruder, but one of greeting, or perhaps eager anticipation, for there in the distance was her returning mate. She flew straight towards him, and I could see that his hunt had been successful. The two birds were flying perhaps a hundred feet above the ground. When only a few feet separated them the male, with a deft flip, tossed to his mate the small object that had been carried in his claws. She missed the catch. Swooping downward, she missed again. Finally, in a last desperate power dive, she caught the now rapidly-falling morsel just as it was about to disappear into the tall grass. A near-by haycock, left from the preceding season, served as a dining place, while the male, quickly discovering my presence, objected so strenuously that I left.

The variation in the ages of the young hawks in each nest was quite apparent, indicating that incubation began as soon as the first egg was laid. Never uttering a sound, the young birds, at my approach, would open their mouths wide. This was evidently an act of intimidation, for their chief weap-

ons of defence were the sharp claws, which, I discovered, they could use with surprising accuracy and effect.

With at least five marsh hawk nests within a radius of half a mile, and the ever-increasing demands of the growing young to be met, I feared that neighboring birds of other species would fare badly. But bobolinks and marsh wrens successfully raised their families a few yards from the nests of the hawks, while the numerous red-winged blackbirds worried the marsh hawks far more than the hawks bothered them.

When hunting, the parent hawks ranged far, each pair evidently in its own territory, and woe to the striped ground squirrel that, unheeding the warning whistle of its mother, strayed too far into the farmer's grain-field. These young rodents, coming just in time, comprised the staple food during the nesting season.

After the young had learned to fly they spread out into the surrounding country, and I often saw them hunting mice in some open field or bit of marshland. Flying low, quartering back and forth against the wind, a bird would suddenly stop in mid-air, hover for an instant, then drop on its prey. And as I watched I hoped that the following spring would again find a number of these interesting birds engaged in nesting in the big marsh.

Do Nighthawks Drink?

By ARTHUR H. FISHER

A LITTLE MORE than ten years ago Guy L. Eadie, until recently a keeper at the National Zoological Park, defied the experience of other bird lovers by attempting an experiment that had thwarted the efforts of all keepers of aviaries. He selected as his subject a nighthawk, *Chordeiles virginianus,* because he had been told that it was impossible to keep nighthawks in captivity. Thirty days of cage life was then the best known record. Backed by years of experience in handling birds from every part of the world, plus patience, Mr. Eadie set out to break this record.

This interesting species, ranging in its migrations from northern Canada to South America, has an enormous stomach and requires great quantities of food to sustain its long continued flights. Its entire diet comprises insects taken on the wing, so it is easy to see that Mr. Eadie had no small task before him. Records show that the stomach contents of one specimen held 1800 winged ants, and of another 60 sizable grasshoppers. Seeing equally as well in daylight as at night, these voracious feeders, except during the warm hours of the day, are constantly sweeping the lower air lanes for insects of all sizes, with a preference for the small ones. Yet he succeeded in keeping one alive and healthy for nine years. Almost equally remarkable is the fact that during those nine years every morsel of food—each entomological tidbit—was fed from his own fingers.

Mr. Eadie experimented with three adult specimens. The first lived one year, and during this period not a single drop of water or other liquid refreshment was placed in its cage or administered. This convinced him that our nighthawks do not require water, probably obtaining the necessary amount of moisture from the insects that form their menu.

Of the other two birds, one lived three years and the other nine. In the latter two trials a small saucer of water was always put in the cage, but although they were under his constant observation during as much as twelve hours a day, he never saw them make even a gesture toward taking water.

He always started their diet by feeding meal-worms, which seemed to give them a good start. However, after a certain period they would refuse this form of food, and flies, moths, an occasional cockroach or other orthopterous insect became their regular diet, varied sometimes with the cooked yolk of egg. If food was placed in their cages it remained untouched, and their demand for finger-proffered food was continuous and exacting. Fortunately Mr. Eadie's duties brought him past their cages throughout the day, and seldom did he pass without a nice insect to offer them. Aside from his efforts and success, no one else has beaten the thirty-day record, and Mr. Eadie's answer to the query, "Must nighthawks drink water?" is "No." Nevertheless, it must be admitted that the observations of naturalists afford a few instances of nighthawks having taken water in the course of their hunting expeditions.

A Day in a Dog's Life

JONESEY

Jonesey learns the meaning of the "Don'ts"

By DIANA THORNE

Illustrations by the Author

HE WOKE quite suddenly out of a deep sleep, disturbed by puppy-dreams of mingled exquisite bliss and dire anguish. He rolled on his back, stretched his full length and blinked at the long, pale streaks of sunlight that came through the cellar window. A fleeting thought of Jim was quietly replaced by one about food.

Bounding off his small blanket, he trotted up to the kitchen. The swinging door leading from the kitchen into the rest of the house was closed, but a thinking pup, even one six months old, can open a swinging door any time he really wants to get to the other side. He pushed with his head and shoulders, and then carefully squeezed through. The door gave his short, stubby tail a slight pinch as it closed behind him. His quick yelp was not very loud for he had expected the pinch from past experience.

He ambled through the house, almost stopping in the library to bully the bear-skin rug, but satisfied himself with a look and a sniff for he remembered that his goal was upstairs. Anyway, playing with that rug was definitely one of the Don'ts, but it was amazingly convenient often to ignore rules that interfered with pleasure.

When he arrived at the top of the stairs he listened carefully. There seemed to be no noise in the big bedroom. The door was open and there were some toothsome-looking slippers on the floor, beside the bed. But he slid like a fleeting shadow into Jim's room, thinking that he must be a reformed character—or too hungry.

"CASTING SIGNIFICANT GLANCES AT THE MILK PITCHER"

He put his front paws on the edge of the bed, cocking his head a little to the left as he looked at the sleeping boy. Jim's feet were bare and all the covers were pulled up around his shoulders. Jonesey—for such, alas, was his name—began to lick the bare toes. Jim kicked his feet and giggled in his half-sleep. He opened one eye and looked into Jonesey's two. "Woof," said the dog. Jim flung out a sleepy arm to embrace him, and Jonesey was instantly on the bed.

An hour later there was a stirring in the house. Jonesey shook the sleep of his nap from his eyes and abruptly sat up. He could hear HER talking softly to HIM in the room where the slippers lay.

Soon SHE would go downstairs and those nice smells would come out of the big, hot thing in the kitchen. It would be well for a fellow to be around at that time. Besides—here he violently scratched a place that itched on his neck—being in Jim's bed is one of the tiresome Don'ts. A pup does hate to be spanked with a folded newspaper. Jonesey paused long enough to nibble a piece of Jim's hair that stuck up in the back, then he jumped silently from the bed, and went downstairs.

That was how he happened to be sitting on the wrong side of the kitchen door, politely waiting for HER when she came to get breakfast ready.

"Why, you bad puppy," she scolded, "how did you get in here?" SHE looked around carefully to see if he had done any mischief, and Jonesey accompanied her courteously on her tour. Finally, giving an anxious bark, he sidled towards the kitchen. SHE laughed as she began her endless morning marching back and forth between the Big Cold Thing and the Big Hot Thing. Jonesey ran after her, licking his bright tongue and casting significant glances at the milk pitcher.

"No, I am not going to feed you," she said, "you'll just have to wait until Jim is ready to give you your breakfast."

A delicious piece of toast, freshly buttered, lay on the table. He was sure it had winked at him. "DOWN," she warned in a terrible voice as he nearly had it. Jonesey dropped on all four and slunk under the Big Hot Thing. He was ashamed because he knew his Don'ts as well as the next dog, but he was just a little disappointed that he hadn't gotten away with the toast.

Jim came and took him out in the back yard and tied a rope to his collar. Jonesey gnawed gently on Jim's fingers while he was doing this, and made noises in his throat. He really did not mind the rope at all, but it was fun to tease Jim, and, besides, fingers of little boys were made for puppies to chew on. At least that seemed logical.

"Some day we will live where there aren't so many cars and you won't have to be tied up this way," Jim said, as he tied the rope to the clothes line. "You are a crazy pup, pal, and we can't let you loose. You'll get run over sure as shootin'. See?" Jim hugged Jonesey, who wriggled and squirmed, because he loved Jim and because he wished to remind him that he had not had his breakfast yet. The speech had been entirely wasted on him. He did not even try to catch the gist of it. He just accepted the inevitable.

"SHE BEGAN WASHING HERSELF AGAIN"

Jim then brought breakfast, but he made Jonesey speak for it. This always seemed a needless waste of time, but he got it over with, obediently.

Soon a group of boys, on their way to school, stopped for Jim and came into the back yard to play with Jonesey. Then they went off to school and left him. He watched them until they were out of sight. The back yard was suddenly very empty to him. He stood whimpering gently and began to chew on a stick. After a while, he dozed off.

Jim's mother—SHE, to Jonesey—looked out of the door and saw him lying in the sun. She smiled as he let out muffled barks and a subdued growl. She did not know he was having one of his dreams—the one in which he was always lying in some bushes by a water hole in an unknown forest. In this dream he was waiting for a shadowy animal with long horns who was coming down the path for a drink. When the creature neared the bushes, Jonesey jumped at the horned one's throat. Jonesey always growled so savagely when he reached this part of his dream, that he woke himself up and found himself shaking with fear as he looked around to see where such a threatening noise had come from. As there was no other dog around, he was rather embarrassed for a moment.

Suddenly something within him whispered: "Go and see if your bone is still where you put it yesterday." He flew across the yard to the end of his rope and dug frantically under the cherry tree. The bone was still there and smelled even better than he remembered it. While he was chewing on the bone, the kitten from next door swaggered into the yard. Jonesey hastily buried the bone and he went to meet her, barking a friendly greeting. Without reply or warning, she sat down and began to wash her face. He watched the procedure curiously until, as suddenly as she had begun, she ceased the operation, and, reaching out with lightning-speed, she tapped him on the side of his nose with her velvety paw. Jonesey was so astonished that he began circling around and barking. She paid no attention and began washing again. He lay down in front of her and panted from his exertion. Being ignored hurt his vanity, and he began elaborately investigating the ground in front of him.

He caught a large grasshopper and played with it. Then a strange thing happened. The kitten pushed her muzzle right into his paws and began to crunch. Jonesey was stunned. He had never tried eating a grasshopper. In fact, he had never tried anything larger than a moth and here was this scrap of a kitten devouring a huge, jumping grasshopper, between jumps! He came a little closer to make sure that his eyes were not deceiving him. "Psss!" hissed the kitten. Jonesey backed off hastily and lay down limply. His stomach nearly turned over inside of him. He kept a respectful distance until she had finished the last bite. And then, when she began again taking an elaborate bath, he offered to help. He became so enthusiastic over the task, that he licked her indiscriminately all over, only biting an ear slightly in passing, a temptation he could not resist.

Jonesey felt her protesting weakly under his grasp but he held her down and finished the job. A moment's pause and she scrambled free, crying loudly for her mother as she fled. Jonesey heard the woman who lived next door and owned the cat and kittens, scolding the kitten. It was nice that she did not connect him with the incident.

He went back to the shadow of the house and sat down. There was cooking going on inside and he sniffed and whimpered. SHE was moving about inside but paid no attention to his complaints. So he cried more loudly. Finally SHE came, picked him up and carried him inside. Once inside, Jonesey leaped through the rooms, skidding on all the small rugs. This always gave him a feeling of exhilaration, especially as it was one of the Don'ts. Then he ran upstairs. There were no socks in easy reach, and the place where the shoes were kept was closed up tight against him. So he went into the bathroom.

"HE CAUGHT A GRASSHOPPER AND PLAYED WITH IT"

Jonesey was busy in the bathroom when he heard a familiar hum from below. He wanted to go downstairs to investigate, but first he peered carefully through the bannister. Just as he had thought. She was running Big And Shiny, whose breath blew in, and who ate up things faster than any dog could. Big And Shiny had a purr that hurt his ears and so he carefully detoured into the library,

wondering why people had such big noisy instruments.

Glaring right at him were the bright eyes of the strange animal on the floor. He growled, but, as usual, there was only silence from the rug. Jonesey pussy-footed around it carefully. After all it was twice his size and had a most extraordinary smell. Suddenly he made a lunge at it and for a delightfully terrifying moment it seemed to him that the huge thing moved under him. He waited but there was no other movement. This time he caught a sprawling leg in his teeth and gave it a mighty shake. Somehow, he found himself enveloped by that huge paw. He gave a startled yelp, shook himself free and started for the door, where, unfortunately, he collided with HER.

"Bad," she said, a word that seemed strangely to humble him. She spatted Jonesey's hind quarters with a folded newspaper. Jonesey tucked his spanked part down and crept behind a chair. He sat sulkily while she straightened "flat one" with her foot.

"Come here," she commanded, but Jonesey put his chin on his paws and stared at the wall.

"Come here, I say," she repeated, in a more severe tone.

Jonesey barked, by way of saying: "Not while you have that folded paper in your hand." She dragged the unwilling pup to a closet where she frequently shut him in for punishment. The door closed in his face. He banged angrily against it for a time; then he cried. Nothing happened, so he subsided to chew the mud from between the pads on his feet and to meditate. If he could just remember the Don'ts and the No's he would not get into such difficulties he thought. He sighed and went to sleep.

"... BUT JONESEY PUT HIS CHIN ON HIS PAWS AND STARED AT THE WALL"

When he woke he was hungry and thirsty. It must be long past mid-day. He scratched, barked and cried. Silence. He sang his own version of a dog's "blues song." It was a beautiful song, he thought; it should melt a heart of stone.

As the last note echoed through the house, he heard gravel crunching in the driveway and listened intently. The front door opened and he barked with wild joy.

"'COME HERE,' SHE COMMANDED . . ."

As SHE came closer to his door, he calmed down.

"You poor puppy," she sympathized, "I am sorry I was gone so long."

Her tone seemed to Jonesey repentant and it reminded him of his grievance. He marched past her with his head carefully turned away. She laughed. "I believe you're mad at me." Jonesey sat down with his back towards her and stayed so while she petted him. "Do you want some milk?" she asked. All his hurt feelings melted suddenly away as he cavorted madly about the kitchen.

With the milk still dripping from his whiskers, SHE picked him up, deposited him in the back yard and tied him up. "Be a good dog," she said, "while I am having company."

Jonesey lay down and chewed on his rope. There was a crash from behind. Turning, he saw a strange dog that had just upset a large can and was devouring bits of food spilled on the ground.

"Get out of here," barked Jonesey from a safe distance at the end of his rope. "This is my yard."

The strange dog paid no attention, but just went on chewing. It made Jonesey's mouth water. Food being eaten by anyone at all always had this effect on him. Jonesey snarled, becoming really annoyed, and made running motions with his feet, pretending he was about to charge. To his surprise the rope gave way and sent him flying over the ground at an astonishing speed. He tried to stop himself by sitting down but he skidded past the strange dog, knocked his head smartly against the pail and landed against a tree.

"COME ON, YOU CAN BE MY DECOY"

The strange dog made the hissing little noises that dogs make when picking their teeth and grin-

ned unpleasantly at Jonesey. He rumbled, as though to say, "Well, now you are free what are you going to do to me, young un?" His tone was insulting. Nevertheless, Jonesey thought it wise to change the subject. We can only imagine, of course, but perhaps the conversation went like this:

"Are you a cocker spaniel? Or a Skye terrier?"

"Naw. I'm just a cur, and I love it."

"Won't you stay a while? Perhaps another scrap of something."

"I am going down to the fishhouse. They have lots of things to eat there. Fish heads. Want to come along?"

"My family won't let me eat fish."

"Your family, my paw. You aren't tied up any more. Come on, you can be my decoy and learn a few things."

So Jonesey bounded into the alley trying to keep pace with his new acquaintance. His heart beat with excitement especially when they came to a street crossing. The stranger went right ahead.

"You aren't afraid of cars?"

"Naw. They're afraid of me. I chase them."

Jonesey stuck very close to the Cur in the streets. All the cars whizzing by made him dizzy. Presently Cur darted down an alley. Jonesey followed. Through a hole in the fence they went, and into a back yard. There were a few pieces of smelly fish lying about, but the best smells came from a barrel near the fishhouse door. When Jonesey reached the barrel Cur was already there and all that could be seen of him was his tail and hind feet protruding on the top. Gobbling noises told him that he had better hurry before Cur ate everything. He stood up as high as he could, then he tried jumping, but could not reach the top. So he flung himself against the barrel. It turned over and fish-barrel, fish heads and Cur all rolled in different directions.

Jonesey began to devour the delicious things on the ground, but Cur ran towards the fence as fast as his legs could carry him.

Eating, Jonesey did not notice a man with a broom come rushing out at him. It was too late to flee. The hand was raised to strike and Jonesey knew fear. Not the kind he had known at home, but something much more frightening. In that long moment, while he waited for the hand to come down on him, he suddenly felt quite grown up. The meaning of all the Don'ts which he had been taught became quite clear. But the blow did not come. The man just looked at him. He was so little crouching there. When he looked up Jonesey knew he could escape if he wished. He wasted no time.

He ran as he had never run before in his life, and while he ran fear still ran beside him. Instinct told him not to get in the way of the cars. He dodged them successfully. And while he ran he knew he would never run away again. His home and his people became, now, very precious to him. He must never leave them.

When he reached the back steps, he panted wildly. He lay down and rested, exhausted. After a while, he had a wild yearning to be inside with his people. It was dark and they would be eating their evening meal. His own supper, warm and delicious, would be waiting for him. He whined softly. He dared not make the big noises he had made only this morning and this afternoon. He trembled at his earlier audacity.

For a long time he waited and then SHE came, lifted him in her arms and took him inside. He wanted desperately to show his gratitude, but how could he? So he just turned his head and licked the arms that held him.

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Wayfaring Thoughts

By OSCAR OSTLUND

All knowledge that we have is like a faint spread of light on the horizon before dawn. On a vast, unlighted sphere many things are still asleep; unseen, swaddled in a cloak of shadow; shapes concealed.

• • •

Science approaches, touches, but does not comprehend a final definition of reality. We have no word for our identity in life, or space or time. We do not understand life. We do not understand death. They are mystic terms to which we have grown accustomed.

• • •

One reliable fact that a seeker of truth has to stand upon —a starting point for his adventure—is the earth itself, its rocks, soil and streams; all outdoor phenomena, trees and wind-swept prairies; the perpetual motion of seasons; the ebb and flow of living sounds; movements of music from zone to zone in rhythm with the climate; sun-led, migratory passages of birds.

Here is Nature's original framework of thought. Here is an institution that has not been shaken in the current upheaval of systems and beliefs.

• • •

The significant thing is not that we are born and that we die. The significant thing is that we *think*.

• • •

Men are ransomed from mortality by thoughts.

• • •

Nothing in Nature is motionless. The dust below our feet, and in the air, the dust that colors the arch of heaven blue, has been a thing of life in ages past. Our transportation is driven over the earth and through the air by gas, which has an organic pedigree. The fuel tanks of cars and airplanes are filled with the residues of animals and plants. All physical phenomena are correlated in the converging ramifications of geology. "Time is one in its course; all progress one in plan," says Dana.

• • •

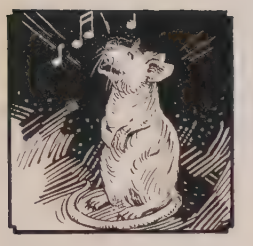
Motion, which is everywhere, is inseparable from time. One light moment upholds eternity.

One green bush on the earth is an emblem of immensity.

STRANGE SENSES

By ALAN DEVOE

Decorations by Jex



The hearing of the creature Man is inadequate for detecting a great many of the sounds that are audible to other species of beings. The dog-whistle recently put on the market made this evident enough. The whistle emits a note so high that human ears cannot hear it, but dogs hear the sound perfectly. Realization of the inadequacy of the human ear has suggested to science the probable solution of an old mystery: the mystery of the singing mice. For centuries there have been periodical reports, by astonished housewives and others, of mice that burst into song. So rare were these reports, and generally so unverifiable, that there was a good deal of doubt as to their authenticity, but recently experiments have indicated that mice probably devote a good deal of their time to singing, frequently and lustily, the songs being perfectly audible and doubtless highly pleasing to other mice, but usually pitched so high that only a very rare human ear is capable of hearing them. The people who do hear the reedy trilling of the little mouse-melodies are probably the same people, mentioned a while ago in *The New Yorker,* who are able to hear the "silent" dog-whistles. It is a curious thing to realize that our universe is probably loud with a mighty chorus of sounds and songs that we human beings never hear at all, just as (according to the entomologist Hingston) it is undoubtedly full of lights and colors that the ants see perfectly but we do not, and just as (according to many a scientist like the late Sir Oliver Lodge) it teems with a multitude of unseen shapes.

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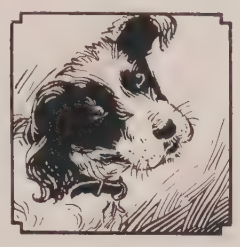
Bats, which hunt their food at night and fly with great rapidity, might often crash into obstacles if they had to rely on their eyesight for flight-guidance. Instead, they rely on a mysterious extra kind of "hearing." Their ears, and possibly also the delicate membrane of their wings, are so subtly sensitive to changes of air-pressure and sound-wave that they are enabled, as it were, to "hear" an object in the darkness before they can see it. Experimenting scientists have blindfolded bats and released them in rooms in which had been strung an intricate criss-crossing network of wires. The bats—rendered truly "as blind as a bat" by the bandaging of their eyes—flitted about the room at top speed for more than an hour and never touched a single wire.



Are dogs able to perceive the smell of fear? A great many dog-owners, kennelmen and students of animal-lore think they are. As explanation of the fact that dogs seem to show a mysterious hostility to persons who are afraid of them, no matter how perfectly such persons may conceal their fear (as far as human eyes can see), these observers adduce the theory that a frightened human being gives off a fear-scent, undetectible to human nostrils, but which is detected by dogs and has a peculiarly maddening effect on them. The late great naturalist, William T. Hornaday, believed in this theory, and it has been supported by many other writers and dog-experts. There is at any rate nothing essentially improbable in it, for dogs have been conclusively shown to possess sense-perceptions that human beings do not have. In 1927 the German animal-psychologist, Engelmann, conducted a series of experiments to determine dogs' proficiency in auditory localization. An electric bell hammer was tapped on metal, sometimes behind one and sometimes behind the other of two identical paper screens. Engelmann progressively narrowed the distance between the two screens in order to find out the fineness of the dogs' localization-ability. The result of the experiments was to establish that the most inferior dog has a sound-localizing sense vastly superior to that possessed by the sharpest-eared human being. Engelmann further found, in subsequent experiments, that the hearing of cats and even of chickens has a discriminatory power lacking in human beings.

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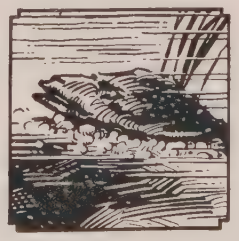

Among the most astonishing phenomena in the natural world are the movements and activities of various kinds of "mindless" creatures under the influence of light, or the absence of light. The tropism that induces plants to grow always toward the sun is familiar to almost everyone, and for centuries has been utilized by Oriental gardeners who by turning their potted plants and shrubs a few degrees each day have been able to get extraordinary spiralling effects in stems and leaf-growths. Less familiar than this common behavior of plants is the behavior of oysters. Although an oyster lays as many as 50,000,000 eggs in a season, it might soon be extirpated if it had no sense-information as to its environment. An eyeless animal, it is endowed with a strange re-

sponsiveness to light and shade. As long as the light strikes its body, it lies with opened shell and sucks in its particles of food from the water. But when a shadow is cast athwart it, the oyster is moved to close its bivalvular shell and remain hermetically armored until the shadow has passed away again. Science calls the various sorts of light-responses by such names as "photochemical awareness" and "scioptic reaction," and, having uttered these impressive phrases, grows humbly silent about the reasons.

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We human beings are such prisoners in our familiar world of three dimensions and five senses that it is very hard for us to imagine a color having an odor or a sound having a shape. It requires indeed an almost impossible imaginative effort for us to experience in fancy the sense-world of an ant. An ant's vision, humanly speaking, is quite poor, the eyes having few facets, and the greater part of the ant's tough-armored little body is impervious to tactile sensation. The ant's perception of its universe is chiefly through its feelers. In these delicately-nerved perceptors there is a tactile awareness that is very keen, and there is also simultaneously a sense of smell. Our own human sense of smell is fused with the sense of taste; in the ant it is further fused with the sense of touch. In so far as this extraordinary blend of awarenesses, which science calls a "topochemical" sense, can be translated into terms of human experience at all, it may be said that it is as though we should experience somehow a bitter taste of squareness, or detect in our nostrils perhaps a faint pungence of circularity. The next time you see a colony of ants at their busy labors try to arrive at your own conclusions as to how they react to introduction of foreign objects of various sorts. Imagine, if you can, just what shape and odor they may have to the delicate perceptions of these insects.

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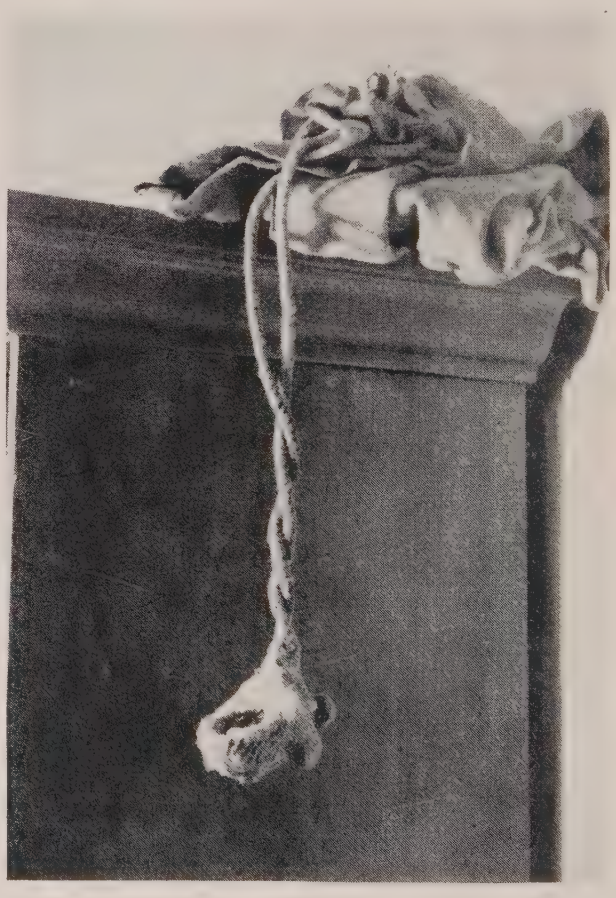
A Black-chinned Hummer's Nest

By W. W. WHEATLY

BIRDS build nests in all sorts of unusual situations, and Clinton G. Abbott, director of the Natural History Museum, Balboa Park, San Diego, California, sees lots of queer pranks played by our feathered friends. But nothing quite so unusual has showed up as a hummingbird's nest recently brought to the institution by Mr. and Mrs. Frank Miller of Hemet, California.

An old duffel-bag had been tossed over a wooden beam in the walnut-packing house on the Miller ranch, and the loose end of the cord was left dangling in mid-air. In the looped end of this free-swinging cord, a pair of black-chinned hummingbirds affixed their delicate, fairy-like nest, fabricated from vegetable down and spider's webs.

In this dainty but tenacious cup, resembling a tiny piece of sponge, two eggs were laid. But these members of the smallest class of birds did not hatch the miniature eggs. The door of the house slammed shut one day and the hummingbirds abandoned the nest. It was then that the Millers brought it to the museum—duffel-bag, cord and all.



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Failure

By ALICEBURTON HACKETT

If carolling at daybreak brings
No ache of urge within my throat,
Nor maddening need to soar and dip
Upon the ecstasy of note;
Or should a dim road's entering
The forest's leaf and shadow fail
Some day to make my heart respond
In wonderment upon the trail,
It shall mean my heart has lost
Its magic, and that day I'll be
Not old nor dead, but out of full
Agreement with reality.

Bryce Point, when seen from the bottom of the canyon, towers like a dream castle over the vast expanse of Bryce Canyon National Park in southern Utah. This park is a wonderland of color and fantastic erosion. Union Pacific Railroad Photograph.

OUR SCENIC WEST

It would be unwise to try to point to any one of the scenic assets of many of our western states and declare it to be unsurpassed. With such a wealth of recreational areas from which to choose, each place will have its special supporters. There will be those who prefer the varied allure of Yellowstone Park, and those who will revel in the rugged magnificence of the Grand Tetons, both of which are in Wyoming. There will be those who will contend that Mount Rainier, with its snow-capped splendor, outstrips the beauties of the new Olympic National Park, or of Mount Baker, or of other places in the Cascade Range. In California we will find those who favor most the redwood region, the beauties of Yosemite, the geological interest of Mt. Lassen, the rugged sierra of Sequoia, or the new Kings Canyon National Park. There is a wealth of scenery from which to choose.

Dotted through our western states and Alaska are National Parks and National Forests; National Monuments and Primitive Areas; Recreational Areas, such as Boulder Dam has created, and Federal Wildlife Refuges. In these pages we present pictures of outstanding areas in fourteen of our western states and Alaska. In the little state outline maps on each picture is shown the approximate location of the Park, Forest, Monument or other area. We make no claim that these are the finest bits of scenery in the particular states. They are only samples of what America holds of beauty and natural splendor; of the assets that we as a people own, and which have their part in making the United States of America the finest place in the world in which to live.

Last October, when the registration for selective service was taking place, one young citizen refused to register because he could not see anything in the country worth saving. No American who knows and has seen America would venture such an excuse. That which we have is worth sacrifice. We have something worth fighting for, in the unsurpassed glories of our mountains, lakes and forests. Now is a good time to see America.

In the southern Rockies, Rocky Mountain National Park in Colorado preserves such scenery as this—the Mummy Range in the northeast corner of the Park. It is a spur from the Continental Divide, a tumbled and majestic mountain mass that includes some of the loftiest peaks and one of the finest glaciers. Photograph courtesy of the Rock Island Railroad.

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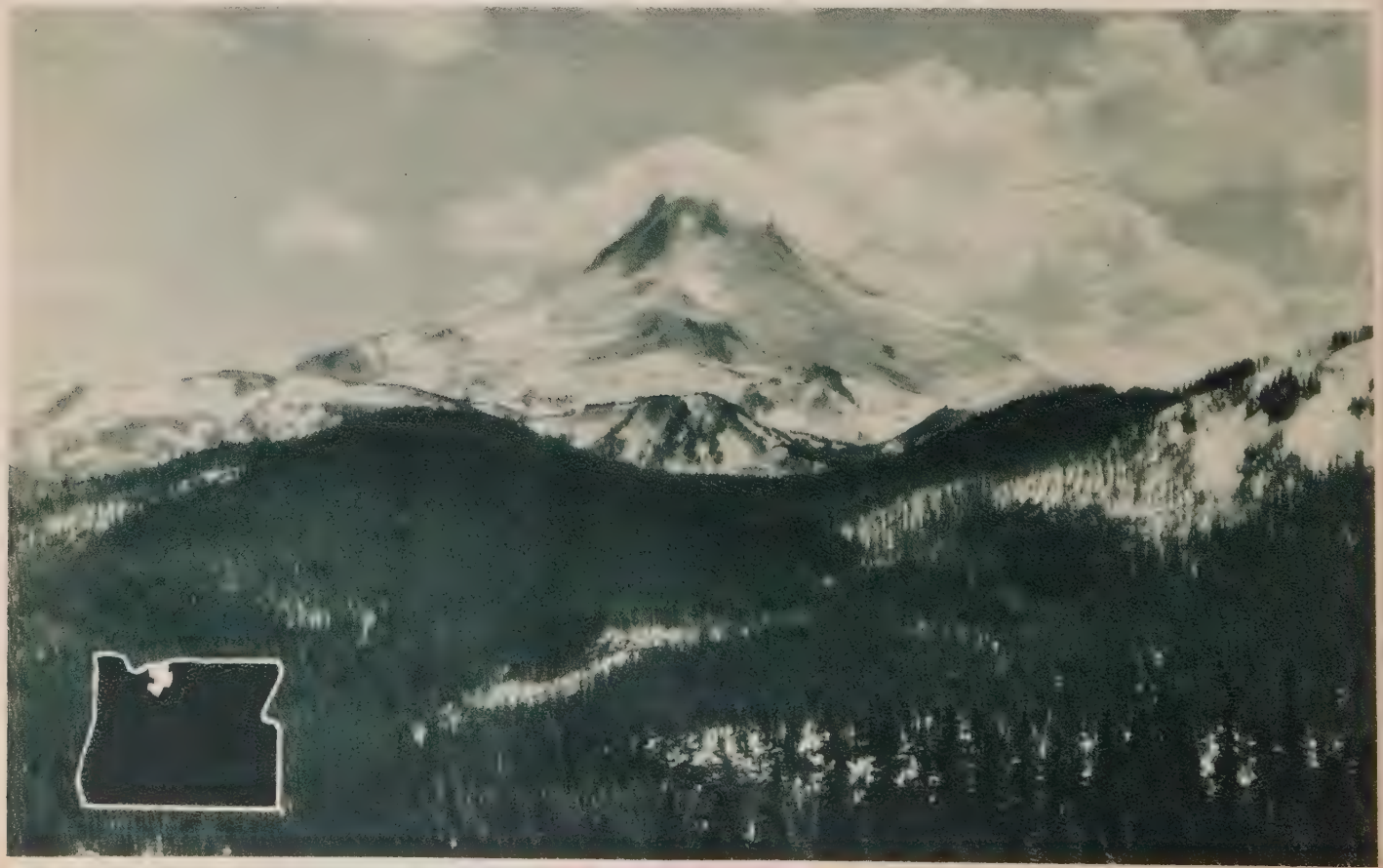
Many expect to find New Mexico an arid, semi-desert country, and while much of its area fulfills this expectation, there are several National Forests where one finds such scenes as this in the Santa Fé National Forest. New Mexico also boasts the fascinating Carlsbad Cavern National Park and several National Monuments. Photograph courtesy of the United States Forest Service.

Glacier and Grand Teton National Parks are noted for their rugged mountains. Embracing the Teton Range of Wyoming, the latter park covers an area of about 150 square miles, including six large lakes and many smaller bodies of water. In the lower country are forests of pine, fir, spruce, aspen and cottonwood, but much of the area towers above the limit of timber, the Grand Teton reaching 10,500 feet in altitude above the floor of Jackson Hole. This park is a mecca for the hiker and climber, the hardy visitor who is eager and willing to penetrate the wild fastnesses by trail and live with Nature in its unspoiled beauty. In the beautiful Union Pacific Railroad photograph at the right we see Mount Moran, the fourth highest peak in the Park.

Glacier National Park is, for the most part, a wild park. It covers 1534 square miles of the finest mountain country in America, embracing sixty glaciers and two hundred lakes. Horseback and foot trails take the hardier visitors into the northern parts of the park, where chalets and tent camps provide accommodations. On the north, Glacier joins the area of Waterton National Park of Canada, and a spectacular road runs northward to Banff and Lake Louise, and to Jasper Park, outstanding Canadian park areas. In the National Park Service photograph below we look down upon Many Glacier Hotel on the shore of Swiftcurrent Lake. From this point radiate many trails.

Texans are now urging the creation of a National Park in the Big Bend Country in that little jog in the Texas line on the west. Here we see the mouth of Santa Helena Canyon where the Rio Grande breaks through the Mesa Angula. The cliff on the left is in Chihuahua, Mexico; the one on the right in Texas. This is in the Big Bend. Photograph courtesy of the National Park Service.

Crater Lake National Park in Oregon is one of that state's outstanding scenic spots, but it is only one of many in a state that boasts Mount Hood and Mount Jefferson, seen below as it rises majestically above the Mt. Jefferson Primitive Area in Mount Hood National Forest. Photograph courtesy of the United States Forest Service.



Marshes and Their Environs

GREAT BLUE HERON

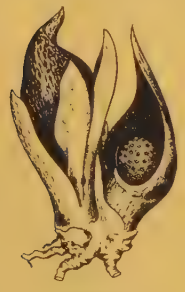
The fourteenth in Nature Magazine's series of educational inserts

By E. LAURENCE PALMER

Plant drawings by Elizabeth L. Burkmyer; animal drawings by M. Hope Sawyer

WHEN a silt-laden brook or river enters the sea or a lake, it ceases to flow or lessens its speed. It can no longer carry fine earth and plant materials, and these settle to the bottom. As time goes on, the accumulated sediments will gradually approach the surface. Eventually there will be a broad expanse of fine, rich earth well mixed with organic and inorganic materials and well watered. Since there is no shade except for that provided by the water, it will be well lighted. Here is an almost ideal situation for many kinds of living things.

Most trees cannot grow, of course, in such locations, because there is no firm base to support them. Land animals that require dry retreats cannot live here exclusively. There are, however, plants and animals for which these conditions are ideal, and it is absurd to consider these lands as wastelands. From them, we may harvest food, shelter and some of the comforts of home.



SKUNK CABBAGE

NUT GRASS

WATER PLANTAIN

Many animals that live partly in marshlands have been considered in earlier inserts in this series, particularly fur animals, upland game birds and water birds. So varied are the forms to be found in marshlands that only the species not treated previously are considered in detail here.

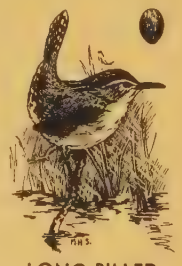
Since all activities of animals and plants are determined by the temperature, stability and chemical nature of their environment, it is not surprising that marshes vary when the water feeding them is salty, alkaline, acid or neutral. This, of course, has more effect on living things that are completely or partially submerged than on those that may seek food and shelter on the surface of the marsh. In general, the living things found in marshes have made their adjustments over long periods of time. The erection of dams that affect the normal flow of water into a marsh; the diversion of streams to increase or decrease the flow, which affects the concentration of salt and other minerals in marsh waters; the introduction of sewage and of industrial wastes—all may create new conditions too quickly for reasonable adjustment by marsh inhabitants. The result may be an area unsightly in appearance and below normal so far as productive possibilities are concerned.

"But," you may say, "what returns could you expect from a marsh?"

It is believed that marshland, properly managed, should be able to produce from ten to twenty-five muskrats per acre per year, and that the pelts should bring from 75 cents to $1.40 each. Without management, such lands in Ohio produced muskrats at a profit of $5 an acre per year, although this is probably higher than the average for Ohio. It may be lower than the average for some other states. While other fur-bearers are to be found in marshlands, muskrats probably represent the staple product.

Management calls for harvesting the animals when the furs are prime, and by such methods, mainly live-trapping, that females bearing young may be freed, so that a steady supply may be maintained. This has been wellnigh impossible under the laws existing in some states.

Management further calls for encouragement of those plants, such as cat-tails, which provide food for muskrats, and discouragement of some of the sedges that have little food value. It demands that the water level be so maintained that the anchored houses or the bank burrows are not flooded when inhabited by young, and so that destructive droughts are prevented. Fires must be avoided in managed muskrat swamps, both because of danger to the animals, and because they remove the cover that protects young and old muskrats from hawks, owls, and some other natural enemies.



LONG-BILLED MARSHWREN

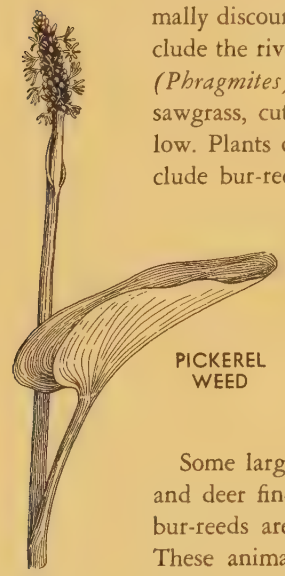
BULRUSH

SWEET-FLAG

YELLOW-HEADED BLACKBIRD

Since the muskrats carry on most of their activities where plant growth meets the water, management calls for the construction of bays, canals and lagoons that will give a maximum of shoreline per acre of ground. Houses must be protected from thoughtless destruction. Pelts must be removed and cured intelligently. Cordial relations must be maintained with fur buyers to assure a fair return.

A marsh may yield waterfowl as well as muskrats, but a good muskrat marsh may be a poor waterfowl marsh. Muskrats and waterfowl do not in all cases feed upon the same plants. Cat-tails may provide good food for a muskrat but they give little to the waterfowl aside from shelter. Sweetflag, another plant useful to muskrats, is of little use to waterfowl. Other plants, normally discouraged in waterfowl marshes, include the river bulrush, the sedges, the reed *(Phragmites)*, saltflat grass, needle rush, sawgrass, cutgrass, horsetail and water willow. Plants of food value to waterfowl include bur-reed, wild rice, arrowleaf, duckweed, spike rush, pickerel weed and water smartweed. These latter plants boast succulent or edible vegetation, useful fruits and seeds, or valuable underground parts that may be reached by the feeding birds.



PICKEREL WEED

Some large game animals such as moose and deer find food plants in marshes. The bur-reeds are particularly favored by deer. These animals also eat the floating green algae *Spirogyra* and *Vaucheria,* marsh grasses such as *Glyceria,* and *Calamagrostis,* and wild rice. A list of the species of marsh plants favored by moose is a long one.

Primitive man in America got much food from his marshlands and consequently often made his home nearby. Some Indians still use their canoes in harvesting wild rice, which is beaten from the plants into the canoes as they are pushed through the marsh. Indians also have used the pollen-producing flowers of cat-tail in the making of certain kinds of cakes. The young shoots of cat-tails may be eaten like asparagus; the pith of the stem and of the underground parts are rich in starch content. Even skunk cabbage, which grows at the edge of marshes or in adjacent swampy ground, may provide nourishment for those patient enough to prepare it properly.

Sweetflag, common in some marshlands, flavors a popular old-fashioned candy. Marsh marigold is used as a salad; also in homely medicines, as are peppermint, spearmint, skullcap and others.

SNOWY EGRET

The richness of the soil of marshlands, of course, makes it tempting to men, who, by draining the land, can use it for farming purposes. Too frequently, however, the drained lands are found to be unsuitable for agriculture. The result is that a useful area has been abused or destroyed and nothing of value is produced in its place.

Man gets other materials from marshes besides food. Cut a cat-tail leaf across and it will be seen that the interior is composed of large air spaces separated by thin walls and covered on the outside by a thick surface. What in Nature is more ideal as a basis of heat-insulating material? Patents have been granted in this connection, but superior materials from other sources are found more profitable.

Marshlands have long served as sanctuary for those seeking escape from their enemies. They may be relatively pathless, or marked with confusing mazes of paths in which strangers may quickly become lost. While the traveling may not be easy for such animals as deer, the water at least serves to destroy the scent useful to pursuing dogs. The same applies to escaped convicts and for other persons pursued by bloodhounds, or outnumbered by their enemies.

Marshlands also provide a superior sanctuary for the nesting of such birds as the rails, gallinules, herons and their kin. Some of these animals spend their whole lives in the marshes, but others go to them for rest or shelter. Many of our large wildlife sanctuaries are established either in or adjacent to marshlands because of their superior offerings to wildlife of food and shelter.

Marshlands are important in land building. Where they are plant-covered, erosion by flood waters is prevented and the interlocking plants serve to hold debris, which assists further in raising the level of more or less solid ground. Unless this material is washed away in succeeding floods, or ground out by movements of ice in the spring, reasonably solid land is built. Before this washing can take place, much of the debris becomes buried among the plant wastes and cannot be moved easily.

AMERICAN BITTERN

While anyone can see the debris collecting in flood-covered marshlands, not everyone notices the more important role played by the inconspicuous ooze-forming plants that cover the loose muds bordering the areas of cat-tails, rushes and sedges. These ooze-formers may be even more important as land builders than the more con-

WHITE-FACED GLOSSY IBIS

spicuous plants. Generally these algae have more or less sticky surfaces. To these surfaces adhere many of the sediments buoyed by the muddy waters, and once they are stuck they remain fixed unless violently torn loose. The oozes then serve to clear the waters of sediments and to add successive layers of these useful materials to the floor of the waterway immediately bordering the marsh, and even to much of the water-covered land within the marsh itself. Spring freshets frequently show good-sized masses of these oozes that have been torn loose from their anchorage and floated downstream, but even then they settle at some other place and assist in a small way in building up the bottom eventually to form land. Water willow, cat-tail, bulrushes, arrow-head and other plants, by means of structures that thrust their way out from the edges of marshland either above the water, through it, or under the soil surface, help further in the conquest by plants of an increasing portion of the earth's surface.

Wind and sun reign supreme in marshlands. The wind beats down on plants and animals alike, sweeping in from open lake or down the river valley, so we find our marshes covered with cat-tails, sedges and rushes that merely bend in the wind. Normally the leaves are ribbonlike, more or less tough and elastic.

As suggested earlier, large woody plants are not common in marshlands. They might easily be blown over for lack of firm footing to hold their root systems in place. In the South, cypress trees seem able to exist on such a footing, assisted by their peculiar bases, which form a broad, firm structure not easily upset.

The sun beats mercilessly on the marshlands, so it is not surprising to find the marsh populated by plants whose broad surfaces are exposed to the sun when it is in its weaker moods, while the smaller surfaces are exposed when the sun is most intense. This the cat-tail, bulrush and iris do most effectively.

Most large reservoirs that supply drinking water to large or small communities are bordered in some places by marshlands, or by the plants of marshlands. Marsh plants have two important effects on the water of reservoirs. Some aquatic plants found in or adjacent to marshlands may discolor water or give it an unpleasant flavor. Others may be important in freeing an excessive amount of water into the air rather than conserving it in the reservoir for use by man. The brown stains of such waters as those found in the Dismal Swamp cut off effectively the light that can penetrate the water and encourage the growth of submerged plants. As a result areas that might otherwise support an abundance of food for ducks are essentially biological deserts so far as the ducks are concerned.

BLACK-CROWNED NIGHT HERON

RED-WINGED BLACKBIRD

When winter comes, the tops of most marsh plants are unable to survive. Their relatively soft tissues are quickly killed, while the portions buried in the mud may continue to survive.

The death of the delicate erect parts of marsh plants provides a splendid tinder-like accumulation of material, well aerated and perfect for a raging fire. Where such conditions exist near railroads, garbage dumps or industrial plants, the result is often a raging fire, which, if the wind is right, may sweep with incredible speed across a territory that once was a thing of beauty. When the fire has passed, there is little left but the charred stubs of sedges and the smoking remains of the stems that support the cat-tail heads. Fortunately for most of the larger forms of animal life, they have left for happier lands to the south, or, like the muskrat, have submerged in water to find safety. If the tinder-like plants survive the winter, however, it may be some weeks in the spring before they have dried sufficiently to burn readily. By the time this dryness has been attained, birds like pheasants, ducks, marsh wrens and redwinged blackbirds may have begun nesting. Some of these may be caught in the flames and themselves perish, but all nests are destroyed and the amount of suitable nesting cover greatly restricted. Fires, then, should be avoided at all costs in marshlands.

BLUE FLAG

In the thickly-populated regions around cities, marshes, such as those in New Jersey, are each year being reduced in size by drainage ditches that permit a quicker and more complete drainage of lands even near tidewater levels. Then, too, these places provide what seems to be an ideal place to dump garbage, ashes and other refuse to make a suitable foundation for new golf links, industrial plants or even parks. In gaining these new quarters for his interests, man undoubtedly reduces the annoyance and possible disease he gets from mosquitoes, deerflies and other marsh-bred insects, but he (Continued on page 212)

COMMON NAME SCIENTIFIC NAME	**WATER PLANTAIN** *Alisma* (1) *A. plantago-aquatica,* (2) *A. gramineum*	**BUR-REED** **Bur-flag, Ox-tongue** *Sparganium*	**ARROW-HEAD** **Wapato, Duck Potato** *Sagittaria* (1) *S. latifolia,* (2) *graminea,* (3) *teres,* (4) *platyphylla*	**PICKEREL WEED** *Pontederia cordata*
DESCRIPTION	Height, to over 2 feet. Leaves, in rosettes, with long petioles for, on the average, over half the length and broad-pointed, egg-shaped, coarse-veined blades or if submerged, no blades or these simply ribbon-like. Related species, *A. gramineum* (2) commonly narrower bladed.	Up to 5 feet high, of rosettes of long, erect, limp or partly surface-floating, flat, keeled or three-sided leaves, with fruiting stems either erect or limp. Identified largely by fruit clusters. Important species, (1), *S. eurycarpum;* (2), *americanum;* (3), *chlorocarpum;* (4), *angustifolium;* (5), *multipedunculatum.*	Height, (1), to over 3 feet. Leaves (1), like broad spearhead; (2), (4), slender spear; (3), slender, not spear-head-like. Basal tubers of (1), size of potato; of (3), size of BB shot; of (4), the "delta potato". Much variation in shape of leaves dependent on depth of water.	Height, from 1 to 2 feet, with coarse, rather thick leaves, with heart-shaped blades and long succulent petioles from a short stem or stout root-stocks. Color a rich, dark bluish green.
RELATIVES AND RANGE	Class Monocotyledoneae. Family Alismaceae. In marshes and wet spots, from British Columbia to California, Florida and Nova Scotia, with *A. gramineum* widespread in Europe, Asia and Africa.	Class Monocotyledoneae. Family Sparganiaceae. In marshes, along the margins of still or slowly-moving bodies of water. Various species occupy all southern Canada and United States, except states bordering Mexico but including California. (1), widest spread.	Class Monocotyledoneae. Family Alismaceae. (1) Freshwater margins, southern Canada and most of United States (2), submerged in fresh water; (3), mud flats and shallows; (4), fresh or brackish water.	Class Monocotyledoneae. Family Pontederiaceae. Along margins of waterways through southeastern Canada and United States east of the Dakotas and central Texas, but most abundant along Great Lakes and Atlantic coast.
LIFE HISTORY	Flowers, small, on the ends of slender branching, stiff structures. In *A. plantago-aquatica,* petals are white; in *gramineum,* pink. Nutlets crowded in fruits with 2 ridges and a groove down the back; in (1), 3 ridges and in (2), 2 grooves. Perennial and maintained through winter and adverse conditions by a stout underground corm, which can divide and produce new units.	Fruiting stem bears at and near tip spheres of staminate flowers that shed pollen into wind for lower spheres of pistillate flowers. These in (1) are close to flowering stem. Fruits of (1), with 2 stigmas. Nutlets (1), triangular-egg-shaped; (2), slender spindle; (3), tight-belted spindle; (4), broad spindle. Perennial.	Flowers produced all summer on erect stems, white, in whorls of three, with 3 petals and 3 sepals producing crowded beaked nutlets, which have beaks that in (1) are horizontal and incurved; in (2) are incurved and short; and (3) are erect and short.	Attractive violet blue flowers in a crowded spike at the end of an erect flower stalk that supports one small leaf. Flowers do not last long but produce 3-celled fruits, one cell of which bears a single seed. A most attractive plant in all ways.
SPECIAL CHARACTERISTICS	Must have water in abundance at some time to grow and may survive submergence for a long time.	Plant serves as anchor for soil in wave-beaten or river-flooded flats and as food for many birds, mammals and insects. Some of plants may be tuber-bearing and supply extra food through these. (1) may favor lime while (4) may favor acid. Transplanted by seeds or rootstocks.	Mostly perennial, milky-juiced, succulent plants. One of most variable plants so far as leaf-shape is concerned, some serving as indicators of saltiness of water. Water-loss through leaves, great, and therefore undesirable as border plants in water reservoirs.	Will tolerate .89% salt and may be locally common in calcareous or in acid lakes, so has a wide range of tolerance. May be propagated by seeds but better by rootstocks.
USE TO MAN	Not an important plant in marshes or for game species. Small quantities of the nutlets have been reported as entering the diet of wild ducks and of pheasants, but never in significant quantities. The ducks concerned include 12 species.	All species provide superior cover and favored food for muskrats, preferred food by deer, and good food and cover for water fowl, the last eating nutlets and tubers. Of the species mentioned (1) is probably most important to wild-life.	Ducks eat fruits of most species, leaves of many species, the whole plant of (3) and the tubers of all species, particularly of (4). Sixteen duck species known to feed on arrow-head. May well be planted where wild fowl are to be attracted and held.	Plant reported as being excellent duck food and the plant has some market as a garden pool ornamental.

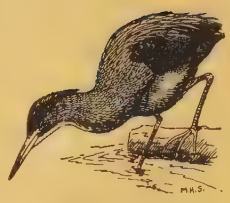
NUT-GRASS Chufa *Cyperus* (1) *C. esculentus;* (2) *strigosus*	BULRUSH Tule, Goose-grass *Scirpus* (1) *S. acutus;* (2), *fluviatilis;* (3), *americanus*	SWEET FLAG *Acorus calamus*	SKUNK CABBAGE *Symplocarpus foetidus*	BLUE FLAG *Iris versicolor*
Height, (1), to 3 feet; (2), to 4 feet. With in (1), tuber-bearing runners at base and in (2), with hard corms at base. Leaves of (1), rather firm and light-colored; of (2), soft and flat. Both with characteristic stem supporting flowers. The "umbrella plant" belongs to this genus.	(1), round-stemmed; (2), leafy-3-angled stemmed; (3), 3-angled culms, appearing like bayonets, stem-like but leaves basal and inconspicuous. Generally these plants form compact mats of horizontally intertwining material over loose soil that is submerged.	Height, to 4 or 5 feet. Leaves, sword-like and arising from a thick creeping rootstock that divides and interlocks with other branches to form a thick mass in which other plants cannot well grow.	Height, to 2 feet or more of coarse leaves which arise after the flowering period and make broad compact clumps. When broken, the leaves and much of the rest of the plant give off a strong odor somewhat resembling that of skunks. A thick heavy rootstock.	Height, to 3 feet. Leaves, smooth, erect, flat, sword-shaped, usually light green and arising somewhat fanlike from a coarse, horizontal, underground rootstock which branches to form an interlocking mass with age.
Class Monocotyledoneae. Family Cyperaceae. (1), in low ground and river banks from New Brunswick to Washington, California and Florida. (2), in meadows and fields Maine to Minnesota, California and Florida. Best in sandy soil.	Class Monocotyledoneae. Family Cyperaceae. (1), through United States except southeast, and southern half of Canada; (2), New Brunswick to Dakota and south to middle states; (3), same as (1) but not quite so far north.	Class Monocotyledoneae. Family Araceae. In swamps and at margins of lakes and streams from Nova Scotia to Minnesota and south to Florida and Texas; also found in Eurasia. Favors rich but not strongly calcareous soils.	Class Monocotyledoneae. Family Araceae. In swamps, bogs and similar wet places, often in the edges of marshes, from Nova Scotia to Minnesota, Iowa and North Carolina.	Class Monocotyledoneae. Family Iridaceae. Best in moist swales and marshy lands but can survive drying during a part of the growing season. From Newfoundland to Manitoba and southward.
Flowers borne in slender spikes arranged along an axis like parts of a feather and many of these coming from a common point with some modified leaves. The seeds and fruits small and unimportant as game food though they are eaten in the heads.	Most of these plants reproduce largely by vegetative division, although the fruits and seeds do serve to establish new sites and in other capacities. Flowers usually borne on erect culms that continue beyond the flower cluster.	Flowers crowded on an upward bending stem arising from near the top of what appears to be a large leaf. Stamens, 6 and sepals, 6. Fruit gelatine-like inside and few-seeded.	Flowers borne in earliest spring in hood-like structure appearing early and forming a small sphere; the flowers bear both stamens and pistils, are pollinated by carrion flies, and produce a globular fruit mass roughened by persistent flower parts.	Flowers blue and white on erect flower stalks each bearing a few flowers. Cross pollination largely by bumble bees effected by stamens hidden under spreading styles; pollen does not reach stamen of same flower. Fruits burst to free relatively flat and many seeds. Flowers May.
Prefers in most cases sandy soils more or less free from water during growing season and submerged during the fall and winter. This makes it an easy source of supply for many ducks. Tubers of cultivated chufa ¾ by ¾ inch in diameter when dried.	(1), hard-stem bulrush, tule, in fresh, alkaline or brackish or salt water; (2) river bulrush in shallow fresh water where it is dry during late summer season; (3), on sandy soil and lake margins that are fresh or mildly alkaline or salt.	The interior of the stalk is sweet and the rootstock is strongly aromatic and biting. Some eat the rootstock raw as a supposed cure for indigestion. Plant is reported as being eaten by muskrats but duck raisers advocate its destruction for more useful species.	Can withstand some drying but cannot long withstand exposure to direct sunlight. The plants provide some cover for game but are too widely separated usually to be important in this connection.	Spreads largely by vegetative parts. Persists through heavy grazing but cannot withstand prolonged shade. Rootstocks sliced, dried, kept in dark and mixed with boiling water when ready to use give homely medicine not recommended without doctor's guidance.
Eight hundred tubers have been taken from the stomach of a mallard, and 30,000 seeds from stomach of a green-winged teal. Tubers have been identified in stomachs of wood duck, mallard, black duck, ringnecked duck, canvasback and ruddy duck. Planted freely for game food and cover.	(1) and (3) fifth in importance of plants as food for eastern game ducks; third, in Gulf Coast; and second, in western states. Superior shelter for ducks. (2), considered undesirable. Excellent anchors for soil and pioneers in land building because of mat of interlocking vegetation.	Candy made from rootstocks by cutting into thin slices, boiling and boiling a second time in a thick sugar syrup. It tastes something like candied ginger and is an old-fashioned delicacy with a very minor economic value. Acts as stimulant medicinally.	The leaves if boiled repeatedly with frequent water changes make a not unpalatable "mess of greens" but with other more easily prepared plants available they probably never will be completely destroyed by those who seek them for food. Seeds and roots used in home medicines as antispasmodic.	Somewhat valuable as an ornamental in wild pools and plant has been reported as valuable as muskrat food. Seeds may be eaten by ducks but could never be significant in their diet because of small amount available.

COMMON NAME SCIENTIFIC NAME	AMERICAN BITTERN *Botaurus lentiginosis*	SNOWY EGRET **Snowy Heron** *Egretta thula*	GREAT BLUE HERON *Ardea herodias*	GREEN HERON *Butorides virescens*
DESCRIPTION	Length, to nearly 3 feet; tail, 4 inches; bill, 3 inches; wing, 1 foot. Feathers of head, neck brown streaked, loose and long. Throat white with sides of neck black and wing tips black. Underparts, yellowish. Iris, legs and bill, yellow or greenish yellow. Sexes colored alike. Flight slow and deliberate.	Length, 2 feet; wing, 9¾ inches; bill, 3⅕ inches. Sexes colored alike. Breeding adults with beautiful shoulder plume "aigrettes". Color, white except legs and bill, black and feet and bill-base yellow. The related egret is to 41 inches long.	Length, 4 feet; wing, 19 inches; bill, 6 inches. Throat and crown-center, white, black bordered. Neck, pale brown. Back, tail, wing coverts, slate gray. Breast and belly, black and white streaked. Wing elbows, chestnut. Legs and feet, black. Upper bill, olive; lower, yellow. Sexes colored alike. Young lack white crown and generally browner.	Length, 17 inches; wing 7¼ inches; bill, 2½ inches. Sexes colored alike. Glossy green black on crown and below eye. Throat, white. Back, gray. Wing coverts, green with white and buff margins. Belly, ash colored. Young, neck and underparts, black-streaked; wings with wider light margins.
RELATIVES AND RANGE	Order Ciconiiformes. Family Ardeidae. Breeds in swamps, marshes and wet grasslands in North America from Florida and southern California north to Ungava and the Arctic Circle. Winters southern and Pacific Coast states south to Panama. Casual reports Germany and Great Britain. Known from Pleistocene times.	Order Ciconiiformes. Family Ardeidae. Breeds South America, Central America and southern and western United States. Some move north after breeding. Winters, through most of its range. The larger egret ranges from southern Canada to Patagonia. Both live near shallow waters. Known from Pleistocene times.	Order Ciconiiformes. Family Ardeidae. Breeds, United States and southern Canada. Winters, United States and south to West Indies and Venezuela. Spring migration ends in April; southern begins in September. May be found through year over much of its range. Known from Pleistocene times.	Order Ciconiiformes. Family Ardeidae. Breeds South Dakota to Nova Scotia and West Indies. Winters, Mexico, West Indies and Central America. Southern migration begins in October; northern, ends in April. Salt-water or fresh-water areas. Known from Pleistocene times.
LIFE HISTORY	Elaborate courtship of displaying and "pumping." "Stump-knocker" sound given by male inflating neck and using as bellows. Nest, a vegetation platform. Eggs, 4 to 6, olive buff, 1⅘ by 1⅖ inches, incubated 4 weeks. Young, in nest 2 weeks more and fed by both parents; at first, with light, fluffy down; juvenal plumage at 10 days; adult by October; mature, at 16 months.	Males fight at courtship; both sexes have elaborate mating flights. Nest, of sticks or coarse rushes, a platform in trees or tules; eggs, 4 or 5, pale blue-green, 1⅘ by 1⅕ inches; incubation, 18 days by both parents beginning with laying of first egg. Young, awkward, leave nest in 20 to 25 days. Juveniles molt in March. Adults molt January and June.	Courts in flocks, with vigorous fights and antics. Mates for season. Nest, stick or tule platform, in tall trees or on ground, in colonies. Eggs, 3 to 6, greenish-blue; 2½ by 1½ inches. Incubation, both parents, 28 days. Young, awkward, foul nest badly, noisy, downy at first, olive. Juvenal plumage worn to February. Mature at 2 years.	Courtship, ludicrous hop and prance. Nests singly or in small colonies; one-foot platform of sticks in trees or near water; eggs, 4 or 5, greenish-blue, 1½ by 1⅒ inches. Incubation, 17 days. Young awkward, but climb early. Can swim early. Gain ½ ounce daily first week. Drab down at first. Juvenal plumage until February. Adults molt spring and fall.
SPECIAL CHARACTERISTICS	Feed on mice, crayfish, frogs, small fish and insects eaten whole or mashed. Not active bird. Stands with beak straight up hidden in vegetation when annoyed. Flight, slow and deliberate, neck folded, legs trailing. Migration, not in flocks.	Food, largely insects, crayfish, snakes, small fishes, and 1% vegetable matter. Fly slowly and gracefully; migrate in loose flocks. Nest in colonies, at which time adults have the plumes formerly legally sold. Adults killed for these plumes result in young starving.	Food, largely small, unimportant, slow-moving fishes caught by stalking or waiting while standing in shallow water; also frogs, crayfish, mice, snakes and salamanders. Enemies are gulls, men and crows. Flight graceful, deliberate, slow. May flock up to 60 but most of year are usually solitary.	Food, largely small aquatic animals caught by stalking or diving into water even to depths of a yard or more. May stand on ground head up among grass seeking prey or over water on perch. Flight, slow and steady beginning often with frightened "skeow" and release of excess ballast.
USE TO MAN AND PROTECTION	Probably harmless birds and neither bad nor good so far as man's interests are concerned. Not edible, so not legitimate game, and too slow of flight to challenge marksmanship. Protected by law.	Among the most beautiful of all birds and now protected by law. In 1898, trade in their plumes so great that Venezuela shipped over one and a half million "aigrettes". This outlawed by Nature lovers, but continual vigilance and cooperation by the public still vital.	Ordinarily harmless, beautiful birds worthy of protection, which they get by law in many states. Destruction by hunters and so-called conservationists ordinarily entirely unjustified. Have no competitors for picturesque beauty.	Of little economic value, but too interesting to be killed wantonly and too slow-flying to be a challenge to even the poorest marksman. Protected by law in most states, but probably shot at by most amateurs.

BLACK-CROWNED NIGHT HERON *Nycticorax nycticorax*	WHITE-FACED GLOSSY IBIS *Plegadis guarauna*	RED-WINGED BLACKBIRD *Agelaius phoeniceus*	YELLOW-HEADED BLACKBIRD *Xanthocephalus xanthocephalus*	LONG-BILLED MARSH WREN *Telmatodytes palustris*
Length, 2 feet; wing, 1 foot; bill, 3 inches. Sexes colored alike. Forehead, sides of head in front of bill, neck and underparts, white. Crown, back and upper wing areas, glossy black. Lower back, wings and tail, ash gray. Head plumes, 2 or 3, round, white and 8 inches long. Young, upper parts, gray brown instead of black.	Length, to 26 inches; bill, to 6 inches; wing, to 10½ inches. Face, white, with naked skin between eye and bill. Head, neck and underparts, chestnut except in winter when these parts are streaked with white and brown. Wings and tail, purple. Legs, feet, iris and bill tip, red or reddish. In flight, resembles long-legged, humpbacked crow.	Length, 9½ inches; tail, 3¾ inches; wing, 4¾ inches; bill, ⅘ inch. Male adult, black with scarlet "shoulders" bordered with white or buff but rusty-margined in winter. Female, head and back, black with rusty streaks and underparts black and white streaked. Immature males rusty in place of black, and orange in place of scarlet.	Length, to 11 inches; wing, 5¾ inches; tail, 4½ inches. Female slightly smaller. Male in summer, head, neck and pointed throat area yellow or orange, rest black except white wing patch; in winter yellow obscured by dusky. Female dark brown, without wing patch, throat dull white. Young look brown-headed.	Length, 5⅕ inches; wing, 2 inches; tail, 1⅔ inches; bill, ½ inch. Brown above with black crown *unstreaked* but the back black, with white stripes. Stripe over the eye, white. Under parts, white and flanks cinnamon brown. Grayer as feathers become older. Sexes colored alike.
Order Ciconiiformes. Family Ardeidae. Breeds from Oregon to Nova Scotia and south to Patagonia. Winters from California and the Gulf states south through Central America and South America. Known from Pleistocene times.	Order Ciconiiformes. Family Threskiornithidae. Breeds, western North America including Mexico; South America south of Amazon. Resident in breeding range, withdrawing only towards warmer portions. Occasional in Chile, Straits of Magellan and Costa Rica. Known from Pleistocene times.	Order Passeriformes. Family Icteridae. Breeds east of Great Plains. Other forms occupy North and West, and Gulf coast and Florida. Winters south of Ohio and Delaware valleys. Southern migration begins in October; northern ends in April-May. Sequence, adult males, adult females, immature males. Known from the Pleistocene.	Order Passeriformes. Family Icteridae. Breeds from southern British Columbia to Wisconsin, Indiana, Texas and southern California. Winters, southern California and Texas south into Mexico. Northern migration ends late April.	Order Passeriformes. Family Troglodytidae. Eastern form breeds Ontario and Quebec to Virginia. Winters New Jersey to Florida. Eight subspecies extend range to British Columbia and southern California including Prairie, Western, Alberta and Louisiana Marsh Wrens and the Tule Wren.
Courtship of bowing, caressing and bill-holding by both sexes. Nest, coarse stick platform, usually high in trees in colonies. Eggs, 3 to 7, pale greenish-blue, 2 by 1½ inches. Incubation, by both parents, 24 to 26 days. Young, awkward, in nest 2 weeks; at first gray downy. Juvenal plumage molted by second August. Adult at 2½ years.	Nests built in tule marshes either at water level or up to 5 feet; of woven tule stems, sometimes on old sites. Eggs, 3 or 4, smooth, finely pitted, greenish-blue, about 2 inches by 1⅖ inches. Incubation, by both sexes, 3 weeks. Young, helpless and naked when hatched, but soon black downy. Molt in March and July-August; young, in September.	Males select site, fight other males; females accept site. Nest built of woven plants in marsh above water level. Eggs, 3 to 5, pale blue, streaked with black or purple, 1 by 7/10 inches. Incubation, 10 to 14 days. Young hatched blind, naked and helpless, but leave nest in few weeks.	Male selects site, displays before female, drives out other males. Nest, thick-walled basket hung in cat-tails above water. Eggs, usually four, gray or greenish-white speckled with brown. Young, helpless when hatched, but out of nest, though still fed by parents, in mid-July.	Male stakes out territory and erects many dummy nests. Female accepts same territory and makes own nest with inside doorstep. Nests of woven plants about size of indoor baseball, with side entrance. Eggs, 5 to 9, chocolate or speckled, ⅔ by ½ inch. Incubation, about 13 days. Young, at first helpless.
Food, largely small slow-swimming fish of the shallow waters, also insects, crayfish and mollusks. Fly to and from feeding place night and morning feeding largely at night, and giving "quawk" call. Like a long-legged gull in flight. Wing-beat deliberate; neck incompletely folded.	Food, largely crawfish, mollusks, aquatic insects, small fish and frogs and possibly some little plant material; collected at favorite feeding grounds to which flocks fly from roosts in long diagonal lines with steady, rapid wing-beats with legs dangling behind. Call, a hoarse nasal "ka-onk".	Food, largely insects in summer and seeds in fall and winter, flocks flying to and from roosts from feeding area in great flocks in ranks. Male scolds violently when nest area is invaded. "Konkeree" call is best known sign of spring to many.	Food, ⅓ animal matter and ⅔ vegetable, including weed seeds, grain, grasshoppers. Does not attack garden produce. Congregate in flocks in same marshes with redwings but usually in a separate area. May form huge flocks at end of season when families of the summer unite.	Food, essentially insects gleaned from plants. Active bird particularly with the tail. Song, something like a musical sewing machine, may be heard night or day in the marshes. Scolds vigorously at intruders whether these be humans or other living thing possibly of own kind.
Probably neutral in value and certainly interesting to watch in flight and at rest. Damage done to useful aquatic animals probably negligible and not comparable to that done by man in thoughtless water pollution. Protected by Federal law.	Shot by hunters but can hardly be considered as game bird since it is easy to hit and poor to eat. In spite of this, it has been sold in markets for game. Harmless, interesting bird that should not be allowed to disappear.	May be pest in certain grain areas but ordinarily do more good than harm as destroyers of insects even outside the marsh roosting areas. Pleasing to those who like the marshes and wet spots of the country and generally well known.	About ⅓ of food, waste grain, so may be undesirable if they become too abundant. Ordinarily more than make up for grain taken by insects and other pests destroyed. Always appealing to the naturalist and generally conspicuous.	Certainly does no harm and helps somewhat in control of insects in a region where they are normally over-abundant. Preyed on of course by many animals, and nests used by bees, tree frogs, and other animals. Protected by Federal law.

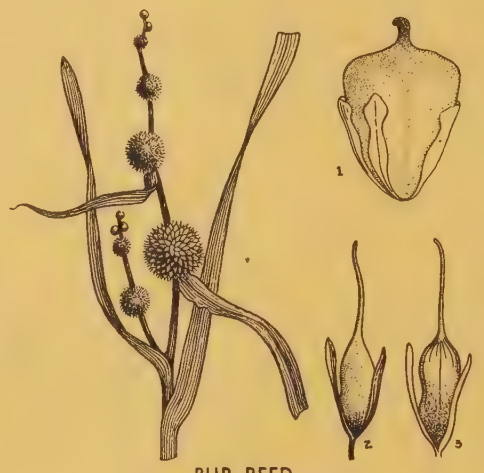
(Continued from page 207) also loses the waterfowl, song-birds, and fur-bearing animals that might prosper there.

Marshlands also serve as ideal breeding ground for spring peepers, toads and other amphibians. While the calls of these animals are pleasing to most people with a rural background, they have proved unusually annoying to some city-bred folk who say that they much prefer the blatant noises of automobile, elevated train and home-coming night clubbers. Since men can make their environment more or less as they like, a decrease in the peeper chorus threatens. To many, this will be a distinct loss.



GREEN HERON

This conflict of interests in marshlands probably meets its greatest height when the different government projects clash head on as to whether these lands should be drained to eliminate the mosquito menace or left untouched to encourage the breeding of game birds and fur-bearers. It would seem that some rational policy could be worked out whereby policies held to in thickly-populated regions might well be recognized as unsuitable in sparsely-settled country. With camps and summer resorts spreading out to find new untouched territory, there is danger that the interests of those who would defend the natural marsh may not be recognized. Of course, where mosquitoes are proved to be important in a disease epidemic, there should be no compromise. Apparently, such epidemics can be controlled without the destruction of the marshes, however.



BUR REED

ARROW-HEAD

It is true that marshlands produce undesirable insects. But our gardens produce cluster flies; our manure piles, house flies; our pantries, cockroaches; our storerooms, clothes moths, and our libraries, silverfish. Simply because a marsh produces unwelcome insects can hardly be accepted as sufficient reason to wipe it out of existence.

Taken as a whole a marsh is a thing of beauty. I know of few things in Nature more pleasant to watch than the movements of the tops of cat-tails and rushes as the winds play across a marsh. I get a thrill from exploring cat-tail heads to find buried in them and completely insulated from the outside, the larvae of the cat-tail moth. I like to watch a gallinule or a rail, young or old, sneaking in and out of the tall stems of the plants of a marsh. And there are few experiences that can beat the behavior of a parent bittern guarding its nest from an intruder.

Such marshes as those of Bear River Bay in Utah are a sort of heaven in June to those who can stand the mosquitoes and who like to watch the behavior of ibises, snowy herons, tule wrens, curlews, avocets, stilts, bitterns, black-crowned night herons and a host of other birds. There, in the low tules, nest the great blue herons and many others. There, you can wade for miles in water just up to your hips, supported splendidly by the mat of submerged vegetation that covers the looser material beneath. I doubt if anyone who has gone into these marshes on a Nature hunt is not looking forward to the time when he can again go in and stay longer.

Of course any story of Nature interest can be helped by reading the results of investigators who have carried on intensive and serious studies of a related nature. The marshes are no exception. Among the books that those interested readers should examine in this connection is *Life of Inland Waters,* by J. G. Needham and John T. Lloyd.

If you are interested in marsh management, there is a flood of useful material coming from the United States Soil Conservation Service and from the Fish and Wildlife Service. Technical Bulletin 634 of the United States Department of Agriculture is entitled *Food of Game Ducks in the United States and Canada.* It is by A. C. Martin and F. M. Uhler, and should be in the library of every person or institution interested in marsh management or wildlife conservation. To this should also be added W. L. McAtee's *Wildfowl Food Plants; Plant Ecology* by John E. Weaver and Frederick E. Clements; *Animal Ecology* by A. S. Pearse; *A Manual of Aquatic Plants* by Norman C. Fassett, and *Ecological Animal Geography,* rewritten by W. C. Allee and Karl F. Schmidt from the original work in German by Richard Hesse. Of these, probably the book by Fassett gives the most useful suggestions about specific uses made by different forms of wildlife of specific marsh plants. The references by McAtee and by Martin and Uhler give the most practical suggestions for marsh management for the benefit of waterfowl, and the other references help most in understanding why a marsh is what it is. *Field Book of Ponds and Streams* by A. H. Morgan is a splendid guide and introduction to the life of fresh water. It is excellently illustrated, which adds to its value.

There are many spectacular views of the Grand Canyon of the Colorado, both from the south rim and the north rim. From the latter, at Purple River Junction, we look down a mile into the canyon. Photograph courtesy of the Union Pacific Railroad.

Mt. McKinley National Park in Alaska includes within its more than three thousand square miles the highest peak on the North American continent—Mt. McKinley, which reaches an altitude of 20,300 feet above sea level.

There are no National Parks in Idaho but there are many National Forests whose thick-forested mountains give that state a supreme beauty. In these forests Primitive Areas have been set aside to preserve the primeval wilderness, and the recreational development of the National Forests has made available many sites where the lovers of the outdoors can find refuge and relaxation. Above we see timber-clad slopes in the Coeur d'Alene National Forest of Idaho. Photograph courtesy of the U. S. Forest Service.

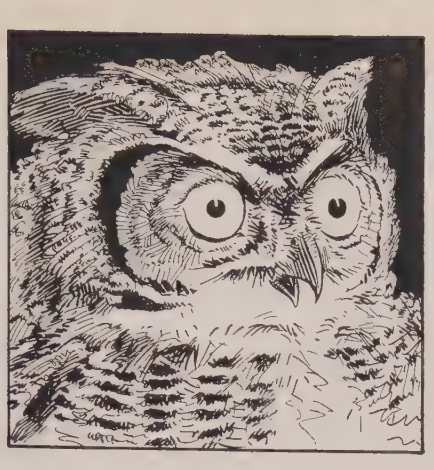
In Nebraska Scott's Bluff National Monument has been set aside to preserve a celebrated landmark on the old Oregon Trail. From the summit of the bluff, which is named for a trapper and explorer who died and was buried near its base, the visitor has a magnificent view of the surrounding North Platte Valley. The region is rich in historic associations.

Mt. Shuksan in northwestern Washington is, with Mt. Baker, which is nearby, one of the outstanding peaks in the Cascade Range. Mt. Rainier and the National Park to which it gives its name, and Mt. Olympus, which is the outstanding peak of the new Olympic National Park, vie with these Cascade peaks for mountain honors in our most northwestern state. This is country rich in the scenic beauty of its ranges and its forests. Photograph courtesy of the National Park Service.

One of the most recent additions to the National Park system is Kings Canyon National Park in California. Just south of Sequoia National Park, with Yosemite it completes a park trio. The National Park Service is pledged to the preservation of this area as a primitive wilderness, with roads limited to an absolute minimum and with trail development to care for visitors. Here we see the view down Grouse Valley. Photograph courtesy of the National Park Service.

With the construction of Boulder Dam, a great lake—Lake Mead—was created, and this spectacular region of fjord-like character was established as a Recreational Area. The scene above is in Nevada and shows the rocks in the inner gorge where the waters of the Colorado River are muddy and swift. When the waters reach Lake Mead they drop their silt to the bottom and are blue and clear. The Badlands section of South Dakota is a unique geological feature, and a representative area of a little more than 150,000 acres has been set aside as the Badlands National Monument. Established in January, 1939, this Monument stretches for thirty-nine miles in a curving arc north of the White River and the Pine Ridge Indian Reservation. A modern highway traverses the Monument from Cedar Pass, near its eastern boundary, through Big Foot Pass, Dillon Pass and The Pinnacles. Photographs courtesy of the National Park Service.

As We See It



CONSERVATION THOUGHT ★ ★

This editorial is contributed by a reader—a naturalist of wide reputation, a close student of our wildlife, and one long interested in its preservation. Because it expresses a viewpoint to which many have yielded; because it should stimulate thought and a sober analysis of how far we have come and whither we are going, we print it here. We hope that it will bring response, whether in agreement or not. There is, today, much loose thinking, wishful thinking and downright dishonest thinking under the guise of "conservation thought".

Conservation may be futile but to be a conservationist is glory. It may be safely assumed that practically all the readers of NATURE MAGAZINE are good conservationists. But that is the point; are we not a sort of close corporation, reassuring each other as to the desirability of conservation, but reaching few others? Do we not preach the gospel chiefly to those already converted, and largely fail to reach those in need of enlightenment? Can the blind be brought to see? Is there any hope?

This observer of the contemporary scene, against its age-long background of exploitation, can not be other than pessimistic over the outlook for the conservation of wildlife. He has fought the good fight but fears that such efforts on his part, as well as on that of others, have won only temporary gains, which, in a crisis, may be lost far more rapidly than they have been achieved.

In view of recent improvement in certain aspects of wildlife conservation in our own land, reasons for pessimism may not be evident to all. The fundamental one is that so long as man has the power, human desires and human needs come first. Our own far-from-distant history is not lacking in convincing illustrations. Mass attack for food decimated, and market hunting finished, the supposedly innumerable passenger pigeons, and except for a few guarded remnants, did the same for the untold millions of buffaloes. The great auk was either eaten by man or used for fish bait; the last Labrador duck went to the market; the heath hen and Eskimo curlew only briefly survived heavy market hunting; and other edible species have been persecuted to the verge of extermination. The saddest thing is that, while reproaching our ancestors for killing off various forms of wildlife, we are applying the same process to other species, and are just as surely and inexorably extirpating them. Practically all of the extinct and nearly exterminated species are those that have been in demand for flesh or fur. They served needs of man, they were coveted, and they were taken.

Still more regrettably, it must be admitted that real needs are not the reason for a great deal of present-day killing. Practically no hunting in the United States in recent times has been for needed food. On the contrary, most of the people doing it are overfed. They would be better off on a reduced, than an increased, diet, and could get all the food they require at a fraction of the cost in the shops. All of our blood sports come under the head of "killing for fun"—an expression so paradoxical that it is utterly to the discredit of the human race that we have any use for it. Sport-hunting, an essentially useless activity, that no humanitarian can condone, is today crowding to the brink of extinction the mountain sheep, woodcock, jacksnipe, and others, and it is now proposed to resume slaughter of the wood duck, a bird written of as a vanishing species forty years ago, but so far saved by protection.

The blood sports are chiefly responsible also for endless manifestations of what is called vermin-control, that is, the killing of all of man's competitors for game. Many of the animals slaughtered in these campaigns are fur-bearers —a long-persecuted group. Again, this destruction, for the most part, has satisfied no real need. What wearer of furs in the cities, where most of them are worn, really needs furs to keep warm? Cloth would do the job better and cheaper. No, furs are strictly luxuries, but to obtain them innumerable wild creatures are tortured to death and various species are being exterminated.

Nor has the spirit of the people that led to such things been changed. A hunter in Wisconsin excused killing of the supposedly protected prairie chickens by saying, "Oh well, they will never breed up again anyhow and I might as well have them as anybody." A sportsman who once held a rather high position in a national conservation organization maintained that the plovers and other large shore birds could not be restored, and that "The gunners might as well have the fun of killing them." Even the scientists are not free from such sophistry, as some of them urge that remaining individuals of rare species be collected,

so that the museums will have more specimens to show.

Among the population at large, no view prevails but that wildlife is for man's use. The people do not look ahead to wildlife's being used up, and if they did the prospect would not deter them. On a recent trip with the writer, an elderly woman noticing a milling flock of starlings in a field near the road cried, "Oh! see how many blackbirds. I wish I had some of them. Birds are good." In a little while she went on, "When I was a girl we used to trap snowbirds. We put a board out in the yard and scattered chicken feed under it. The board was held up by a stick we could jerk by a string from the window. When there were enough birds under it, we pulled the string, ran out, and jumped up and down on the board, and laughed."

As a conservationist, what would you say to that? The writer said nothing; he was silenced by the obvious proof that a certain, and probably large, element of the population has been absolutely unreached by conservation teachings. If that be admitted, it means that frittering away of our wildlife will never cease. It means that there is an ever-present menace of ignorance of, or indifference to, conservation, and of greed for everything consumable.

Menace enough under ordinary conditions, who would even dream that consumption of wildlife can be held in check in times of national crisis? Rightly or wrongly, the survival of mankind is placed above every other consideration. If men are hungry they will eat anything available. The law of necessity takes precedence over any conservation doctrine. At one crisis we may lose one thing and at another something else. In the long run what can be saved?

Yes, the writer believes that at best conservationists can achieve only temporary, tentative, and precarious successes. If man survives and human nature remains the same (as apparently it always has), wildlife of usable kinds will be used. The distant outlook is unrelievedly gloomy.

Yet now we can take pleasure in the wildlife that remains and satisfy our better selves in protecting and preserving it. Some in each generation can have this pleasure on a relative scale, for the experience of no single individual will ever comprise the whole gamut from the encouraging presence of some wildlife to the absence of all. Striving to keep such pleasures as long as may be is justifiable for itself alone, regardless of the final outcome. It is the sort of pleasure envisioned in true epicureanism that may be had with honor and justice. It is always defensible, regardless of the trend of mankind in the mass.

OHIO QUAIL AGAIN ★ ★

At a business meeting of the League of Ohio Sportsmen, held in Columbus, January 18 and 19, 1941, a resolution was passed calling on the Ohio Legislature to restore the quail to the status of a game species. The claim was made that, under the "songbird law," Ohio quail received no protection, but that, if placed in the custody of the Conservation Department, they would prosper and increase.

This effort to put the quail back on the game list, for its own good, has a familiar tang. Ever since the bird was given protection from the gun in 1913, efforts have been made from time to time to give back to the bobwhite the privilege of being shot. The reasons given have varied. Sometimes the claim is made that the bird has so great an increase that it has become a pest to the farmer. At other times it is claimed that the birds have grown so small and weak from inbreeding that they are dying off. And so on.

It was largely through the efforts of farmers on whose land the quail lives that its shooting was stopped. The farmer likes this bird because it helps to keep down the insects that ravage his crops, and he likes to hear its cheerful voice. So as far as the farmer and the quail are concerned, we need waste no worry on either. They have never quarreled. The whole matter became the subject of a careful study by S. Charles Kendeigh of the Baldwin Bird Research Laboratory a few years ago, and the results were published in the *Ohio Journal of Science* in January, 1933. Basing their calculations on all reliable sources available, the scientists estimated that the quail population of Ohio in 1908 was about 1,700,000. In 1913, when the closed season was established, there were about 650,000. From that year on, with no legal hunting, the population figure increased rapidly, although not uniformly, since some seasons were less favorable than others. The estimated quail populations follow:

In *1915,* 1,200,000; *1917,* 1,000,000; *1919,* 1,800,000; *1921,* 3,500,000; *1923,* 4,100,000; *1925,* 3,700,000; *1927,* 2,500,000; *1929,* 2,000,000; *1931,* 3,350,000.

These figures would not seem to indicate any adverse effect on the numbers of the bird through protecting it.

Mr. Kendeigh, from a careful study of the population figures, concludes that, even in favorable years, hardly two birds could safely have been shot by each of Ohio's 400,000 licensed sportsmen, and that so small a bag is plainly impracticable. In unfavorable years even this killing would be dangerous to the species.

As to the birds' relations to the farmer the report stated:

"The intelligent farmer has good reason to wish that the species be maintained in its normal numbers. . . . Some sixty different species of weed seeds and 116 species of insects are consumed as food. Among the insects occur such distinctly undesirable forms as chinch bug, potato beetle, and striped cucumber beetle. The species consumes some grain, but this seems to be largely waste grain that remains after the crop has been harvested."

So far the farmer and the other friends of the quail have succeeded in defeating all efforts to trust the quail to the gunner. But experience has shown in this case, as elsewhere, that constant vigilance is the price of safety. The sportsmen of Ohio have not left much upland game for themselves, or for those to come. The vanishing woodcock, the alien pheasant, and rabbits are about all that are left. So the league of Ohio Nature Clubs, through its legislative chairman, Mrs. Margaret Halenkamp, 180 Webster Park Avenue, Columbus, urges all friends of Bobwhite to write promptly to Hon. Jack Easton, House of Representatives, Columbus, Ohio, and state their views.

Half-a-Million White Ibises

By WINTHROP PACKARD

Illustrated by R. Bruce Horsfall

EARLY in April, 1937, word came from Florida that the beautiful, graceful, big white ibises were coming into the head waters of the St. Johns River in more than usual numbers. That would mean many thousands of them at the big rookery on the shores of Washington Lake, easily accessible by a not-too-bad road, some fifteen miles west of Melbourne.

Florida is fortunate in its wilderness. You may traverse the East Coast from Fernandina to Key West, and back up the West Coast from Fort Myers to Tallahassee, and up and down the middle where the Bok Tower centers, by superb cement motor roads. You will pass through string after string of modern cities, and there will be hardly a mile of this from which Bucky Walters could not pitch a ball into woodsy wilds as primeval as when the first white ibis came from wherever he did and alighted in them. Draw a straight line from New Smyrna, which is just south of Daytona Beach, southwest to Fort Myers, where Edison made pretty good rubber out of Florida goldenrod, and you have about half the state south of this as primitive a wilderness as it was when Ponce de Leon was seeking that fount of youth that ten thousand old men say is there—they have had a taste of it.

Yes, I know, Miami, St. Petersburg, Palm Beach, Sarasota, and a score of other ultra-modern cities fringe this region, but it is just fringe. The rest of it is everglades, Seminoles, alligators, wildcats and a thousand other wild things that infest an unpolluted area of some 60,000 square miles. And birds—billions of the most beautiful and interesting birds in the world. Yes, I mean it, billions of a hundred kinds, from hummingbirds to great blue herons. You may try to count them if you wish. As skilled a naturalist as Alexander Sprunt, Jr., Supervisor of southern rookeries for the National Association of Audubon Societies, gave up even trying to estimate the numbers in this new big rookery of white ibises, egrets and other herons.

Perhaps my estimate of half-a-million is low. Perhaps most of the white ibises in southern Florida came in there that year to nest. Ordinarily they roam the wet prairies of the region, seeking food along with the American egrets, the "long whites", and the little blue herons, half of them so young that they are still in the white phase. If you drive the Tamiami Trail at the right time of year you may see its saw grass prairies dotted with these white birds feeding in flocks, paying no attention to your car as it speeds along, but going up in the air immediately if you stop. It will be the same with the Florida great blue heron, the biggest bird of the Tamiami ditch. It is worth stopping for a moment to see him leap clumsily into the air and lumber along, blanketing the earth for a time with his deep gray-blue, dropping his legs and lighting with alert grace when at a safe distance.

But the white ibises are kings of the air. They will swing like a great storm of wind-driven snowflakes over to another prairie to feed, if still hungry. Or, again, the flock may elect to play for a half-hour, swirling upward in a formation that seems to be under command, lifting the white storm into the blue in great spirals that dance and whirl, interweaving in intricate figures that are all but lost in the ultimate zenith. After a half-hour or so they fall again like a "robin snow" in spring and resume their feeding, white dots on the olive-brown of the long miles of saw grass that stretch away to the everglades horizon.

The level of the watertable in the great everglades

"SLIM, SLEEK, PURE WHITE, WITH VERY BLACK WING-TIPS AND VIVID RED BILL, FACE, AND LEGS"

grass sea is of the utmost importance to these birds—ibises, herons, limpkins, gallinules and a score of others. If it is just right the vegetable, insect, reptile and fish life is prodigious and the wading birds find food on every level acre. Drop that level only a few inches and the vegetation dries up, the abundant life dies with it and the place is a desert. With the best of intentions, perhaps, the State of Florida has over-drained much of its everglade region and, during two dry recent years, the Tamiami Trail, the former Mecca of thousands of grateful ornithologists, has been at times without a bird. The egrets and the ibises flocked to the Shark River region, to Cape Sable and the Thousand Isles below the port of Everglades. They scattered elsewhere, also to undrained sections, and I have seen them rising and falling in the distance like a white surf on a tropic beach along the trail that intersects the Kissimmee River marshes between Vero Beach and Lake Wales.

In 1937, by actual count, 35,000 birds nested in the rookery on the shore of Washington Lake, guarded by warden Eiffler, whose home at Cabbage Mound is on the margin of the rookery. "Cabbage" palmettos shade his camp, whence the name. Almost impassable marshes surround it, and Art, as everybody calls him, has only to keep an eye on the few passable trails that lead in, lest plume hunters—they still hang around—invade the rookery and wreck it for the aigrettes. They had better not do wrong when Art is around, however, and they know it. Art's associate, Alec Hart, has a roving commission in the outlying region, covering he only knows how many miles of good trails and bad, impossible wet prairie and vegetation-blocked waterways through the many square miles of the new rookery. His camp is on a tiny mound in the midst of this great watery bird paradise.

The birds have a disconcerting way of doing the unexpected. They came back to the regular, guarded rookery about the first of April in the usual numbers and looked it over. Then more came, and more; long lines and V-shaped flocks like those of Canada geese swung down from the south and west until there was obviously not room for them in a rookery for thirty-five thousand. So they went north and picked the new place ten miles down the St. Johns from Washington Lake. There they swarmed and set up stick platforms for nests and laid blue eggs on them and roosted in graceful alertness on bending willows. It is hard to tell which Florida bird is the most beautiful, but I now think it is the white ibis in breeding plumage. It is two feet tall, slim, sleek, pure white, with very black wing-tips and vivid red bill, face, and legs. Its swiftly darting, swirling flight is matched by that of few birds.

We had expected to use a small boat and a kicker, and at times a push-pole, to explore the rookery, but this change of base made a change of plans. Art had gone to Tampa to get a boat big and strong enough to push through ten miles of packed, floating vegetation through which the upper waters of the river seep. Alec took us in his sturdy small car over twenty miles of prairie, plunging engine-deep into water holes, bouncing rough ruts, keeping a speculative eye on wild range cattle that sometimes charge cars, ignoring water moccasins, winding among palmettos, over grassy areas beautiful with habenarias, and sabbatia blooms that stood up like great pink roses on stiff, straight, leafless stems, over thousands of level acres of wiry, rough grass, until we finally reached a cattleman's camp at Turtle Mound, the only available entrance to the new rookery. There we took ship. I do not know if it was Alec's ship, or if it belonged to the cattleman. It did not matter. Everybody is everybody else's good friend in this country—or else he is not, as the case may be. As for the ship, it might have been ten feet long, had a disquieting, low freeboard and a slim, pointed bow, into which I squeezed myself with the little movie camera, devoutly wishing I were as small as the camera—which I am not. Well, we all three got in, Alec and his push-pole and his kicker in the stern, and soon we were kicking down the narrow, shallow canal out into the "sud."

I will not tell in detail what happened in the following strenuous hours. Certainly the camera and I got our fill of details of bird life in Florida's biggest rookery of the year. The little boat chattered up open reaches, squirmed through duck lanes in the massed floating vegetation, nosed up against clumps of dwarf willows where egg-filled nests weighed down the limbs and white birds dashed out of the tops by the score, swirled and swung about and dashed back. And then more nests and more birds; the trees full, the sky full.

There I was, jittery in the jittery bow of the little boat, expecting immediate immersion (Continued on page 233)

North American Wildlife Conference

By RICHARD W. WESTWOOD

RELATIONSHIPS between national defense and conservation, education, administrative problems and a wide variety of specific issues affecting birds, mammals and fishes were considered by the Sixth North American Wildlife Conference meeting from February 16 to 19 in Memphis, Tennessee, under the sponsorship of the American Wildlife Institute. Any brief report of a meeting of such scope and importance must, of necessity, touch only the high points and attempt to evaluate the results as a whole.

Unquestionably the most significant and timely general session of the Conference was a panel discussion of defense and conservation presided over by Bob Edge, outdoor specialist of the Columbia Broadcasting System. Representing Congress was the Hon. Ross A. Collins of Mississippi, who outlined the defense goals of this country, and expressed the conviction that these could be achieved without serious effect upon our natural resources if conservationists will be alert and cooperative.

The military viewpoint was presented by Colonel W. J. Bacon, who pointed out that the Army has a big job to do, and that on how it is done depends the future of this country. We cannot, he declared, make war without losses, but there should be no conflict between military authority and conservationists. The latter, however, must recognize that the Army is a "one idea organization", concerned with winning, and that the conservation view must be brought to the notice of the Army leaders by those qualified to bring it.

Colonel Bacon agreed that there would be some destruction of water resources, as, for example, by drainage to destroy mosquitos in the vicinity of troop concentrations, but felt that most of this could be done without permanent injury. There will be, he said, some inevitable pollution of streams, but sacrifices must be made in an emergency and cooperation of the best informed people can ease the burden.

Effectively presenting the viewpoint of the conservationist, Kenneth A. Reid, executive secretary of the Izaak Walton League of America, reviewed the heritage of waste of natural resources in forest, soil and water through our participation in World War I. Pollution of streams, he declared, may be increased by industry taking advantage of the emergency to dump their wastes and by the erection of cantonments. Mr. Reid asserted that new war industry can be located with regard to the pollution problem, and pointed to the serious vulnerability of cities that rely on water from vilely-polluted streams from which water is taken and made safe by expensive treatment plants. Bombs or sabotage would place many a great community at the mercy of the germ-laden waters.

There is danger, the Waltonian leader said, of more land being ill-advisedly put under the plow; of drainage promoters again fattening off our natural resources and the farmer. All values of the land, he urged, should be given consideration, and we should avoid another dust bowl through ill-advised land use. Mr. Reid pointed to the danger of approval of road projects that have been thus far rejected as unnecessary but that will reappear under the guise of defense highways. He urged opposition to blanket legislation permitting use of National Parks and National Monuments for so-called defense purposes. Natural resources, he insisted, are continuing; they are the only source of all wealth and on

Highlights from the address of Dr. Ira N. Gabrielson to the Sixth North American Wildlife Conference:

"We still need about 76 additional refuges totaling four million acres to provide adequately for the birds while they are in this country, and numerous smaller areas must also be added to the system."

"It is imperative that a great many acres of marsh land pass into public ownership of some kind so that it can be protected from needless drainage and destruction, if we are to provide for future populations of waterfowl."

"The importance of the recognition of wildlife needs by owners of private lands cannot be overemphasized."

". . . no very encouraging statement can be made about industrial pollution in our waters. Very little, if any, progress has been made here, and the attitude of industrial organizations and groups is still one of bitter opposition to any attempt to clean up the streams and waters of this country."

"Federal regulations relating to migratory game birds will continue to be drawn for the essential purpose of maintaining adequate breeding stocks."

"One phase of the wildlife program on which we have made all too little progress has been the restoration of fur animals."

"In too many cases we are still overemphasizing the planting of numbers of fish in waters about which we know little or nothing."

"There are now, and always will be, many who would take the last fish, kill the last bird or the last deer, or cut down the last tree, if in so doing they could see an immediate personal gain. It is our duty as American citizens concerned with the national welfare and the future of this country to see that these groups do not prevail."

them depend the future standards of living of America.

Kenneth Reid's stand was seconded by Edward W. Allen, secretary of the International Fisheries Commission, who cited the case of the original planning of Bonneville Dam without regard to the great fisheries resource of the Columbia River. After the Army authorities had been shown the vital importance of this industry provision was made for fishways to assure passage of the salmon up the river to spawn. Such recognition of values should be included in defense plans. He urged that bomb ranges be selected with regard to all values, and so placed that the least damage will be done. We have experts in many fields, and, under emergency conditions, such authorities should be considered and consulted if we are to carry forward our defense program without dooming other assets.

The most significant message to the Conference was that from Dr. Ira N. Gabrielson, Chief of the Fish and Wildlife Service of the Department of the Interior. In his address he summed up the progress that has been made toward achieving the goals outlined in his five-year plan presented to the first conference in 1936. This program sought "more land for wildlife . . . closer cooperation of Federal and State agencies . . . closer coordination of Federal activities . . . a wider recognition of wildlife values by those who manage lands . . . efforts to correct stream pollution . . . adequate research programs . . . and protective regulations based entirely on the needs of wildlife."

These objectives, Dr. Gabrielson said, have been achieved in varying degrees. He asserted that "it is already apparent that it will be necessary to develop land management practices that recognize wildlife values and make such provisions for them as is possible and compatible with other land uses before we can succeed in getting a widespread understanding and application of these principles among the many hundreds of thousands of individual land owners in this country."

Substantial progress has been made, he declared, exceeding that in any other five-year period. Yet, "we have it in our power to solve all of the problems, but it would be exceedingly foolish for us to become overoptimistic, or to lean back with a self-satisfied feeling that all is well and that we can now relax and enjoy a well-earned rest. We still have a tremendous job in restoring wildlife environment, in protecting basic breeding stocks, in cleaning up our streams and other waters, in restoring those that were needlessly destroyed, in the reforestation of our lands, in restoring our fur animals and bringing back an annual income from lands which are not now producing nearly what they might produce in returns of human values and in providing recreation for the American public."

Much important discussion was devoted to varied specific problems of wildlife and fish management at technical sessions of the conference. These papers will be presented in full in the *Transactions of the Sixth North American Wildlife Conference* to be brought out later by the American Wildlife Institute. To attempt to summarize these many reports in a brief story of the meeting would be impossible.

There were numerous other meetings during the four-day session. On the first day the National Wildlife Federation met in public session and discussed the important question of conservation education and the program of the Federation in this field. At a business session, later during the meeting, David A. Aylward was reelected president for the ensuing year.

The active and growing Outdoor Writers Association of America met at dinner, and at a business session that indicated an important future for this group. J. Hammond Brown of the Baltimore *News-Post* was chosen president.

The Wildlife Society, professional organization of those working in the field of game management and wildlife research, held two meetings and its members supplied most of the papers at the technical sessions of the Conference. Richard Gerstell of the Pennsylvania Game Commission was elected president.

To this observer this Conference represented a further constructive step forward in behalf of wildlife. While most of the deliberations were concerned with those forms of wildlife that have economic significance—such as game, sport fish, food fishes, sources of fur and the like—the sentiment was definitely on the side of wildlife itself. The majority interest of this meeting was to consider the sportsman viewpoint, of course, but it was an attitude that the sportsman must be content with less if he is to continue to have anything. In other words, scientific knowledge of our wildlife resources and their use is gradually taking the place of policies dictated by the men who buy hunting and fishing licenses and cannot, or do not, wish to see beyond today's bag. We trust that this attitude is not "later than we think" with respect to some dangerously reduced species.

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National Wildlife Restoration Week, the fourth annual observance of this event, will be from April 14 through April 19 this year. Conservationists throughout the country will observe this week as a symbol of the importance of a constructive program of wildlife restoration throughout the entire year. The National Wildlife Federation has announced the issuance of a limited edition of wildlife poster stamps, thus adding to the series brought out in 1938, 1939 and 1940.

Roadside Protection is the title of an important booklet recently issued by the American Automobile Association. It is a study of the problem of roadside control and is a zoning legislative guide. The report results from an intensive study of the question by the Association's Committee on Roadside Development and Control, and is a valuable guide to anyone interested in working for roadside improvement. Copies are available from the A.A.A. Mills Building, Washington, D. C., at twenty cents each.

PHOTOGRAPH FROM J. HORACE MCFARLAND

NATIVE PLANTS PROVIDE A SETTING FOR THIS RURAL HOME

Trees and shrubs surround it and in the foreground is a rock garden where many lovely American flowers find happy growing conditions and provide a beautiful garden ensemble

Let's Go Native!

By ANDREW S. WING

Garden Editor, Nature Magazine

It is typical of Americans that, while European gardeners have always sought out and cherished our choice native flowers and other plants, we, with few exceptions, have imported most of our garden favorites. Even the marigolds, natives of Mexico, bounced back to us from the Old World labeled "French" and "African", and only recently have plant breeders concentrated on these interesting annuals, and transformed them from Cinderellas into queens.

It is inspiring to note, however, that every year more and more gardeners are waking up to the native beauties of our own land. As gardening in the United States came of age, it was inevitable that this should happen sooner or later; and now that the war has blocked our customary source of bulbs, seeds, and ornamentals from Holland, France, Germany and England, there are more reasons than the purely esthetic to turn the spotlight on our own plant wealth.

We wonder why some enterprising plant merchant has not started a vogue to "Plant American." Why do not individuals and garden clubs go in for All-Southern, All-Western, All-Eastern, or All-American gardens? Perhaps it would be a good scheme; at least, it would result in educating the gardening public as to what is native and what is exotic among our common yard trees and garden plants.

"What does it matter?" you ask. "A flower is beautiful or not, without regard to its origin." True. So is an actress beautiful and a great artist regardless of her origin; but it makes her a great deal more interesting if we know where she came from. The Gordonia tree is beautiful because it is naturally so, but we treasure it the more because it was discovered in 1773 by the first of our great botanists, William Bartram, and then forgotten in his garden for many years before it was made available to garden lovers.

The other side of the fence always appears a little greener than our own. But I suspect, too, that we have been a bit snobbish in our adulation of the "imported". How impressed I was some years ago in walking through a New England woods with an Englishman visiting these shores for the first time, to find that he was almost as familiar with our wild flowers as we were, and treasured them just as much! He had read about them and grown many of them from seed in his own garden in Cornwall! As is well known, the English have been great collectors of fine plants from all over the world since they first began to roam the seven seas. We too have had our great collectors, but I fear that our zeal for collecting exotics has

PHOTOGRAPH FROM J. HORACE MCFARLAND

A LOVELY CLUMP OF TRANSPLANTED WILD FLOWERS

This healthy growth of *Trillium grandiflorum* is in a rock garden. Trilliums are, however, becoming too rare in the wild and should be gathered only with discretion or grown from seed

made us short-sighted as to the charm of our own flora.

But suppose we start naming names and getting down to cases. What would happen if all of the garden plants and yard trees and shrubs that are not natives were suddenly snatched away from us and we were forbidden to buy anything but American goods? Would our gardens, parks, and boulevards be robbed forever of their landscape charm and beauty? Most decidedly, no! They would be pretty bare and forlorn in spots for a time until the gaps could be filled with blue-blooded American stock. But it could and undoubtedly would be done within a comparatively short time—two or three seasons at the most, if funds for that purpose were available.

Being by nature a free-trader, in plants at least, I'd be the first to resist if some horticultural dictator (perish the thought) decreed that we could grow no more plants that hailed originally from Japan, Italy, Russia, or, even more absurd, those with German names. I'd fight anyone who tried to take away my German irises (of course they did not originate in Germany), or who robbed my garden of its Japanese irises, peonies and yews, and its Korean chrysanthemums. I'd hate the thought of losing my French lilacs, my cotoneasters from Asia, the lovely oriental azaleas, the merry narcissus tribe, the indispensable barberries, and even the charming rugosa roses, and our fine young apple trees.

PHOTOGRAPH FROM CARL PURDY

CONTESTANTS WITH THE TULIPS

Several species of Calochortus that merit a place in the spring garden program

But I could garden perfectly well, even though I'd rather not, without the privets, the Chinese arborvitaes, Lombardy poplars, spiny Greek junipers, the Japanese or "false" cypresses (retinosporas), and a lot of the fussy annuals, biennials, and perennials with which our gardens are filled, especially some of the composite tribe. Tulips I'd miss, but I could exist without them, if they would permit me to have crocuses and some of the other bulbs, including *all* the American natives. I could even get along without gladiolas, lovely as their sword-like spikes are, if I could see them now and then in the gardens of others, or in florists' windows or flower shows. The dahlia

PHOTOGRAPH FROM J. HORACE MCFARLAND

THERE IS NO GARDENER WHO IS EQUAL TO NATURE

Jack-in-the-pulpit growing in such a natural setting as this has a charm and beauty that is a challenge to any gardener who adopts a program of "planting American"

is a native of Latin America, so we do not need to go into that.

Suppose, for fun, we start an All-American garden. Here are some of the things I'd plant, mostly natives of our woods here in Connecticut and adjoining states, and fairly wide in their distribution. First on the list would go the elms, even at the risk of their eventual destruction by the Dutch elm disease. Next would come our native beech, slow but faster than most people think. Then the maples and oaks, at least two or three species of each. And of course white birches and a sycamore, if there was room.

Hemlocks would top the evergreen list for specimens and hedges, yes even for windbreaks, although the white spruce and some of the pines, notably the red pine, would run a close second for favor on a large place. Mountain laurel there would have to be, and equally indispensable would be our native azaleas, rhododendrons, andromedas, and the common holly, *Ilex opaca.*

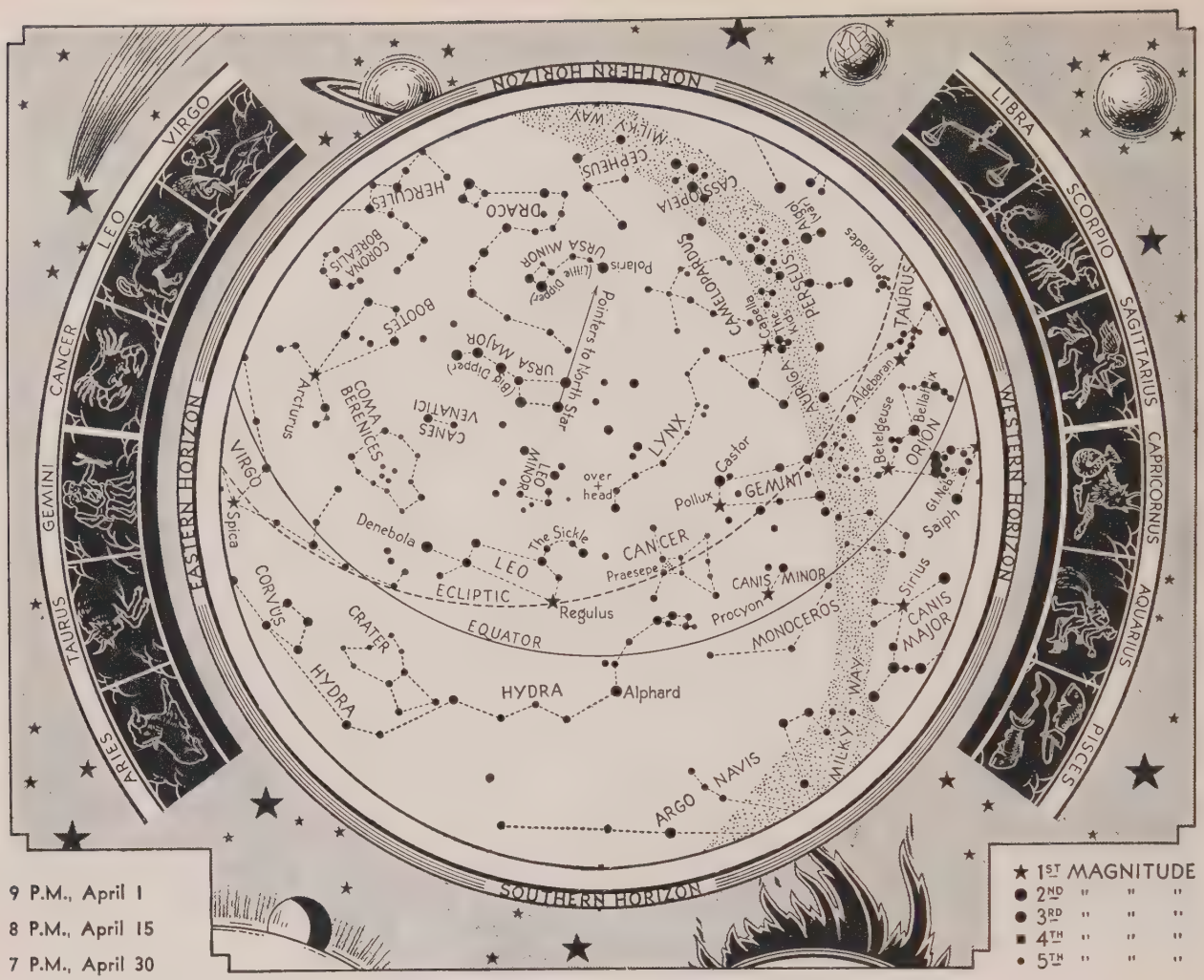
We are fortunate in having a choice lot of native material in the juniper, from the common and widely distributed red cedar, which is tough, useful and picturesque, to the dwarf and creeping forms. There are plenty of American evergreens in this family for almost every landscape purpose requiring a small to medium-sized tree or plant.

Among the shrubby deciduous trees I'd choose mountain ash because of its berries, and the shadblow because of its early bloom. I'd have to have a wild plum, a red bud (Judas tree), a hawthorn or two and some native crabs. There are a good many desirable species of all these scattered across the northern tier of states.

One of the tragedies of our forest was the loss of our native chestnut through the blight. It is gradually being replaced by oriental strains and hybrids, and blight resistance is a hope. However, anyone who is fond of nuts can grow black walnuts or shell-bark hickories, both fine trees, in the North, and in the mid-South the pecan is a valuable native. The hazel nut also makes a good shrub on a large place but is not a sure bearer.

The flowering dogwood deserves a paragraph of its own, for if my choice were limited to but one small tree, it would have to be a dogwood, preferably a white one, although I like the pink ones almost as well for certain places. But there would have to be at least one dogwood, and preferably two or three, the bigger and the crookeder the better.

In early spring spice bush would help take the place of *Forsythia* (an immigrant) that we all would miss, and in autumn witch hazel would light up the dark corners. There would be no lack of material for both flowering and berried shrubs, or for red and yellow bark in winter, although we certainly would (Continued on page 231)



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

Sky Scenes in Different Lands

By ISABEL M. LEWIS

ANY ONE who has followed the parade of the constellations night by night, or month by month, with the aid of a sky map, knows how rapid is the east-to-west shift of the different groups. Our map may show us, for example, the appearance of the sky at nine o'clock tonight, but if we choose to take our look at the sky at eleven o'clock, instead, we shall fail to find some of the constellations that are represented on our map, while others not shown there will appear. Groups that were in the west have slipped below the western horizon, and new ones have risen above the eastern horizon.

This continual westward shift of the sky scenery, night after night, is due to the turning of the earth on its axis, and its onward motion in its orbit around the sun. We either keep closer to the schedule of our sky chart, until we know our way around the year with the stars, or we call upon a seasoned observer for aid. Generally one learns his constellations a few at a time and fits them together like the pieces of a picture puzzle. All goes well so long as the star-gazer does not go too far afield in a north and south direction—for star maps are good only for certain latitudes. One may go several hundred miles north or south of the latitude for which the map has been constructed without noticing any appreciable change in its representation of the heavens as we alter our position. This must not be carried too far, however. Although a journey, north or south, of five or even ten degrees in latitude would not be fatal to the value of our star map, a trip from the northern into the southern hemisphere would make it worthless.

Usually maps of the heavens as seen in northern latitudes are made for forty degrees north latitude, although a map made in Canada is generally for latitude forty-five degrees north. Such a map would be good for any part of the United States, but not for Alaska or the Philippines.

The night skies of New York are no different from those of Chicago, San Francisco, Peiping, Istanbul, or Lis-

bon. These places are all nearly in the same latitude. The same sky map would do for all of them, and other places in approximately the same latitude. A zone bounded by the thirty-fifth and forty-fifth parallels of north latitude, and encircling the globe, would have practically the same night sky. How different, though, would be the appearance of the heavens in a similar zone of the southern hemisphere!

Australia, New Zealand, South America and South Africa have their own sky maps and they appear strange and unfamiliar to us. Polaris and the Big Dipper are absent. In the north one sees Orion standing on his head, Gemini in strange posture, the Sickle in Leo inverted. The heavens at night are studded with brilliant gems, and there is a magnificent Milky Way, but all is different from the sky scenery so well known to us. There is the great ship of Argo Navis, one of the most brilliant constellations in the heavens. The astronomers finally found it too unwieldy and broke it up into smaller constellations bearing the names of its various parts, such as Carina, Puppis and Vela. Canopus, next to Sirius, is the brightest star in the sky. It is in Carina and its other name is Alpha Carinae. It can be seen in winter and early spring as far north as the southern part of the United States, but it is preeminently a star of the southern hemisphere, seen at its best in the south temperate zone. It has been called the Star of Egypt and the Desert Star, and its blue-diamond-like splendor shines over the banks of the Nile where many centuries ago it was an object of worship. A magnificent group in the midst of a brilliant star cloud of the Milky Way is Crux, The Southern Cross, and, not far distant, Alpha and Beta Centauri. These two stars remind us greatly of Castor and Pollux in Gemini. They are spaced as far apart as the twin stars and do not differ greatly in brightness. Both are brilliant stars of first magnitude. Close to Crux and in the Milky Way is that dark nebula known as "The Coal Sack," which so amazed Herschel when he first observed it that he exclaimed: "Here is truly a hole in heaven!"

In this sky map of 40 degrees south latitude will also be seen the Lesser and Greater Magellanic Clouds, not far from the south pole of the heavens. They look like detached clouds of the Milky Way, and are great island universes tens of thousands of light years from the earth. Here, also, not far from the Magellanic Clouds, may be seen Achernar, another star of first magnitude, never seen in our latitudes north of about 32 degrees. It is appropriately named Achernar, for this means, in Arabic, End-Of-The-River. It is the end of the long winding sky-river, Eridanus, which we may see in part in winter and early spring to the west and southwest of Rigel. It is made up chiefly of third and fourth magnitude stars, and Achernar is its only bright star.

There is no bright star—like Polaris in the northern hemisphere—to mark the position of the pole of the southern hemisphere. It lies in a region of faint and inconspicuous stars. The Southern Cross is the timepiece of the southern hemisphere for it crosses the meridian with its upright lying along it in true north-south direction.

In the tropics the zodiacal constellations and the planets are seen at their best. There one also sees the finest of all the constellations of both hemispheres. At the equator there are no circumpolar groups, as those which never pass below the horizon are called. The north—as well as the south—pole of the heavens lies in the horizon and all constellations rise and set daily. The ecliptic arches high overhead and here one sees at its best the beautiful but faint zodiacal light. This can be seen with difficulty in the temperate zones, and then only in spring and fall when the ecliptic rises most sharply from the horizon. It is not unusual for it to be seen at sea in the tropics extending along the ecliptic its full length from west to east. Its faint light is believed to be due to sunlight reflected from countless meteoric particles, or cosmic dust, lying in the plane of the earth's orbit.

In the north polar regions the finest constellation in view is Ursa Major, and next to it Cassiopeia. Both are high overhead. At the north pole itself all stars north of the equator remain above the horizon continuously. The pole-star is overhead and the equator lies in the horizon. The constellations south of the equator are never seen. These include the zodiacal constellations of Libra, Scorpio, Sagittarius, Capricornus, Aquarius, parts of Virgo and Pisces, and the brilliant stars Spica and Antares. When the sun, moon and planets are in these constellations, of course they, too, are below the horizon. As one goes southward from the north pole to the latitudes of Alaska, Siberia, and northern Europe the constellations below the equator rise gradually but they are never seen to advantage in these latitudes. The planets also are near the horizon in general and poorly placed for observation. In summer in these northern latitudes little is seen of the stars due to the midnight sun or long hours of daylight, and a twilight that lasts all night during most of the summer. Long periods of bright moonlight in winter are a disadvantage in the observation of the stars. Yet there are periods when the northern constellations circle around the pole in all their splendor, when the Milky Way arches magnificently overhead and strikingly beautiful displays of the northern lights give to these far northern lands a distinction that sets them apart from any other region of the earth. Probably the least interesting skies in the world are those directly overhead at the south pole, where there is a large area totally devoid of any bright stellar object. Yet here also one has magnificent auroral display to compensate partly for the dearth of other objects of interest.

The planets will not appear to advantage this month in the evening sky. Venus is in superior conjunction with the sun on April 19, when it passes from the morning to the evening sky, but it will be too close to the sun to be seen in the evening sky for the remainder of the month. Jupiter and Saturn are now approaching the sun and are not well placed in the evening sky. Jupiter sets about two hours after the sun, Saturn a little earlier. Jupiter now is just equal to Sirius in brightness, and Saturn is as bright as Procyon. Mercury is in the morning sky, but too close to the sun to be seen well this month. Mars now rises about three hours before the sun and resembles a red star of first magnitude. It is in Capricornus.

THE SCHOOL PAGE ★★★

EDITED BY DR. E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

Marshes as Schools

Peeper choruses, redwing babble, cat-tail fires, muskrat houses, the dance of the midges, forget-me-nots, families of ducklings, flood debris, uncertain muds, pestering mosquitoes, migrating swallows, mink trails, spring holes through the ice, star-nosed mole burrows, crayfish turrets—these are only a few of the many things common to most swamps, the country over, and which draw young and old to the swampy areas. Each has its real lesson to give, and each its bearing on pocketbook, health, sympathy or an appeal to intelligence.

The special insert in the center of this number of Nature Magazine points out a few of the facts centering about marshes and these should be interesting to all. Most of us make our way swampward when the spring fever gets in our bones because there we hear the first blackbirds of the season. But do we notice whether the first singing males are accompanied by the females? Do we find the immature males whose wings are not brilliantly red splashed in this advance guard? Do we notice the behavior of a singing male at first, after he has been mated, and through the nesting season? In this one bird species, we find a conspicuous subject for the study of migration sequences, food range, the establishment and defense of territory and parental care. How many schools take advantage of the opportunity to learn of this bird, or how many schools use the bird merely for identification purposes largely because the common name, red-winged blackbird, is such a perfect description that it requires no brains to recognize the bird if the name is known?

An even more interesting bird is the long-billed marsh wren, and its relatives, which build nests the size and shape of indoor baseballs and well up in the vegetation. The story of how the males build a series of nests without an indoor step and how the female rejects all of these to build her own provides an excellent commentary on home life of many species of animals besides the wrens.

The winter and summer range of these migratory birds is given in the chart section to supplement first-hand experiences that any marsh may offer. These, coupled with the material on other marsh migrants that appeared in the ninth insert of this series, should enrich many a geography lesson and tie it to what is going on in the marsh that the youngsters visit just as soon as they can after school lets out. The youngster may, by his own observation, discover the territory that a pair of marsh birds have established for themselves during the breeding season, but the charts will help him enrich his own experience. Let him select some area in which redwings have set up housekeeping, and, if possible, map out the area into which he himself cannot go without causing the male bird to raise an outcry.

Legal problems associated with marshes bring up questions about trapping laws, sanitary regulations, the sale of bird feathers as suggested under the treatment of the snowy egret and with the establishment of resting areas and breeding areas by the government for the benefit of migratory wildfowl. These problems should be understood in part by every school child if he is to be a good citizen as an adult.

Consideration of the mammals of marshes was given in the twelfth of this series of inserts. It should be consulted if a marsh is being studied. The management of these marshy areas for fur-bearers, or for feathered game, calls for all sorts of variations in plant cover and in flood control. Practical things associated with such management should be known to most people to the end that they may react intelligently to proposed local modifications of marshy areas. An uninformed populace may well lose an asset of considerable value.

It is hoped that children will be encouraged to explore their neighborhood marshes just as they should be encouraged to explore their woodlands, factories, fields and garbage dumps. The more they explore, the more they are likely to know; and the more they know, the more intelligently they will react to proposed changes. To many people, a marsh is a gloomy place. Yet, one of the brightest smiles I ever saw was on the face of a boy who emerged from a marsh covered with mud but happy because he had at last seen a peeper peep. Who can watch a bittern on its nest without grinning? Who has ever seen a young gallinule without wanting to laugh out loud? Who has failed to feel genuinely happy after he has discovered in a marsh his first wild calla or found his first floating nest of grebe? I once took a group of adults through a marsh in June and was caught in one of the worst rainstorms I have ever experienced. We had to breathe through our mouths, the water was coming down so fast; but we saw some things on that trip which were so interesting that years later whenever I have met members of the party they recall the experiences with genuine expressions of satisfaction.

Marsh study by school folks should involve the consultation of the old residents. From them we may learn something of the boundaries of other days. We may get from these oldsters the dates of great floods, the story back of an abandoned ditch, the approximate time when some plant now conspicuous first made its appearance. A marsh in my home town is now well supplied with the water fern *Marsilea*. Its name does not appear in the early check-lists of the plants of the region. When did it come in and how did it happen to be there? If the old timers had not been consulted, this information would not now be available.

But there are other ways in which a marsh may tell its own story. Some time when the water is low, as it may be later in the year, dig down through the muds to see how the different layers of sediments have been deposited. Look for the high-water marks on the trees and shrubs at the edge of the marsh. All of these things are history in the raw. All are fundamental to true appreciation of much that we teach in geography and in science. We glibly suggest to children the number of million years that have passed since dinosaurs walked the earth, but we do nothing to help them understand how we get that figure. The sediments in a marsh may help. Anyone can see that muddy waters, slowed up as they enter a marsh, must drop some of their sediments, but how much? That can be found, in part at least, by studying a local marsh.

Within this calendar year, a profound paper has been published dealing with a method of exploring the ocean bottom sediments. A plunger is driven into the bottom, taking out a ten-foot section of the bottom. In this section are found the remains of things common to warm seas and to cool seas. With this as a clue, some understanding is reached of the changes in ocean current that must have taken place while the sediments were being deposited. There is defendable evidence to prove that it took approximately 200,000 years for this ten-foot layer of sediments to be built up, so here we have a diary of the sea much as we can read the diary of a tree by its annual rings.

In my immediate neighborhood, there is a tree beside a marsh on which there is a mark made by debris floating in a great flood of 1935. That mark will remain there probably as long as the tree lives and certainly as long as I live. How many of you have similar measuring sticks to use in helping you describe what happens to local marshes? We may have a big flood next summer, but unless the water gets up to that mark, which is familiar to my experience, I will know that it is not the equal of the 1935 flood. Because of this, I can speak more truthfully of what happens in the rise and fall of flood waters in my local marsh. Does your school have a single map showing the heights reached by local flood waters during the experiences of the children now in school? If not why not? Is this more important than an understanding of the atmospheric conditions on the moon? I leave that for you to decide, you who teach about dinosaurs and the temperature of Mars and the life of the Carboniferous Age. You will have to get the story of Mars from the books, but you can get the story of your local marsh from the evidence of your own senses. Which would you trust the more? Must you have everything told to you, thought out for you and served up to you, you who pride yourself on being a member of a free democracy, who write long papers on the place of education in a democracy and who talk interminably of independence of thought and of action?

We have allowed our hilltops to be eroded away, our hillsides to be cut by gullies and our lowlands to be covered with rubble. We have been hardly more brilliant in the treatment we have given our marshlands. We have filled them in to provide building sites for structures that were not needed. We have drained them to provide gardens that we have not developed. We have burned them over through carelessness, malice or just for the fun of it and have lost much by so doing. Rarely have we found those who have come to the fore to defend a marsh for the glory and beauty of what it is naturally. It seems to the writer that this is definitely attributable to the fact that our schools have not encouraged the study of these places. Too many

(Continued on page 234)

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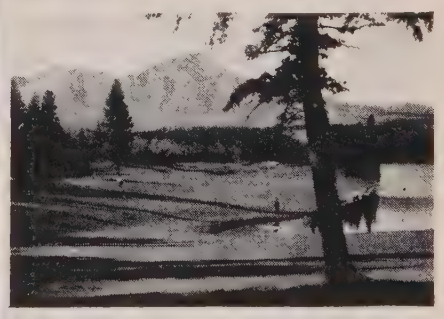

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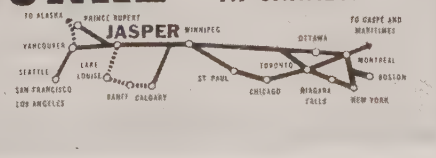

Pottery Plus

After reading articles and reviewing books on soilless gardening we had become increasingly convinced that large-scale activity with such a hobby involved techniques and physical set-ups that would be too much for the average flower enthusiast. Also, we had not been able to see how chemical gardening could be conducted on a small scale in a city apartment or small home.

Apparently these difficulties were recognized and we have recently encountered the answer in the form of what is known as the "chemical flower pot." Ernest Brundin, Montebello, California, horticulturist-experimenter, has found the answer. With the collaboration of designers of pottery, soilless gardening is now carried into the home in both a practical and attractive form.

It is really quite simple. The containers are flower pots in several attractive designs, two of which are shown above. They look like decorative indoors flower pots of conventional character. The only difference is that they are in two parts. The upper part contains gravel into which goes the bulb or plant. The lower part contains the nutrient solution, and into this solution extends a clay or terra cotta wick that slowly absorbs the solution and makes the plant grow. Watering, repotting, fertilizing are eliminated. There is no mud or water drainage. Every couple of weeks the solution is replenished and that is all.

Inquiring horticulturists have experimented with these pots—known as Mineral Maid Flower Pots—and have had success with a variety of plants. Victor Ball successfully grew cactuses, tulips, saintpaulia, gardenia, azalea, geranium, hyacinth, pandanus, peperomia, philodendron, Chinese evergreen, ivy, Boston fern, sansevieria and coleus.

Stumped

Reader response is the editor's favorite fare, regardless of whether the reader responds with a pat on the back or a violent disagreement. And another interesting experience is the sort of things that bring response, many of them unexpectedly. A case in point is a little twelve-line poem by L. L. Thompson in our February, 1941, issue. It was entitled "Stumps", and the poet did not like stumps because they were "tombstones of forgotten trees", and "mocking things", and "scars for passers-by to see". While we did not entirely agree with Mr. Thompson, we felt he was entitled to his opinion, and, since he expressed it well, we published his verses. Several readers took the poet to task, and three of them sent us rebuttal poems.

Eunice R. Hart of Salem, Oregon, answered Mr. Thompson in the following lines:

Stumps are lovely things,
With vines and lichen dressed.
Upon their gray dance floors
The fairies' feet are pressed.

Stumps are restful things;
They speak of battles past.
Near them we rest a while
To dream of peace at last.

Stumps are mystic things,
Full of rare imagery.
There new courage is begot.
I'm glad stumps have to be.

From Madelyn K. Skelton of Bath, Maine, came a note expressing the hope that other readers might agree with the following lines:

Stumps are things of beauty,
Often silver gray;
Or crowned with moss and lichens
If Nature has her way.

Polypods or lichens,
With "British Soldiers" gay,
Make a stump with beauty
Shine along the way.

Stumps mark a fruition,
The life and labor done;
A tree turned into mighty spars
Another course to run.

Stumps are Nature magic,
Silver gray or green.
Past grandeur in our thoughts—
Present to be seen.

Alfred Clum of San Diego, California, says that stumps struck him quite differently from the way they affected Mr. Thompson, and writes:

Old stumps, remnants of ancient pine,
Artistically shaped and colored by time,
Left by lumbermen long years ago,
Peep from leafy curtains at noon-day aglow.

Living here was a mighty tree,
Primitive forest was vast and free.
Wild life in the shadows strolled,
'Til the woodsman's axe caused the giant to fold.

Time has healed the wounds of the wedge,
Rounded and changed the jagged edge,
Giving moss-covered turrets and spires instead;
Creating new grace for the stump called "dead".

New life, new beauty, greet the eye,
Colors change, as the lights in the sky
Filter through leaves of a second-growth tree
On the stump, revealing new joy for me.

With these lines we trust that Mr. Thompson considers himself effectively and completely answered. So far as we are concerned the poetic battle of the stumps is thus ended.

Birds Shun Red

Do birds dislike red? This is the question that Mrs. William Buzby of Boone, Iowa, asks, and with good reason. She writes that in the spring of 1940 she spread a handful of short lengths of bright-colored yarns about the yard for bird-nesting material. Some were given a loose loop around a twig or vine tendril; others were laid loosely on the fence pickets, or on a ledge near the bird bath. The robins and orioles took their shares of this material, and all the yarn disappeared save the red pieces. These remained until fall, untouched. Also, Mrs. Buzby reports that for several summers she wore a red garden hat, at which martins would dive when she passed beneath their house. They also resented it when Mr. Buzby entered the garden with a red bandana around his neck. Often they swooped angrily at a red dress hanging on the line. Further evidence came from the hens. When fed shelled corn, with yellow and red kernels mixed, they would eat both in the yard during the day, but on several occasions when the hens were on the roost they were offered handfuls of corn on which the flashlight beam was focussed. They would eat every yellow kernel and refuse all the red ones. Mrs. Buzby wonders whether hens could not see the red corn at night, or whether, seeing it, they preferred to leave it alone. Still another experience came when motoring to northern Minnesota. The Buzbys stopped in a small town for dinner. A large martin house on a main corner was well occupied and from it the martins swooped at Mrs. Buzby's red outing hat, scolding the while. Several of them followed down the street, darting at the hat. Mystified by these curious experiences, Mrs. Buzby wonders whether other readers have noted anything similar.

LET'S GO NATIVE!

(Continued from page 225)

miss the syringas, beauty bush, bush honeysuckles, and spireas. Still, one could make out by a judicious choice of native material.

For bulbs and herbaceous perennials I would lean heavily on such woodsy plants as various trilliums, mixed with ferns, snakeroot, Canada phlox, *Iris cristata,* bloodroot, anemone, may apple, twinleaf, violets in profusion, wild geranium, Virginia bluebells, *Mertensia,* hardy asters, and goldenrod. If any of my ground were suited, I'd have a bog garden, or at least a pool, with wild flags (blue and yellow), marsh marigolds, cardinal flower, fringed gentian, and native orchids, including the pink and yellow lady slippers. Some of our native orchids don't like wet feet but many of them do like the cool damp earth.

On higher, sunnier ground I would plant wild columbine and the eastern saxifrage, and if there were any rocks about I would tuck in some of the creeping ferns, mosses, hepaticas, moss phlox and Dutchman's breeches, taking care to suit the environment to the plant's preferences as to soil, sunlight and moisture. Mind you, I am just suggesting some of the more obvious things, and not trying to make a comprehensive list. Certainly I would lure all the lilies that I could find into my garden, including the Turk's cap and the meadow or Canada lily. These can be bought as bulbs, collected in uncultivated spots along railroad tracks or dirt roads, or even started from seed. There are a good many different species and not a homely one in the bunch.

I could go on indefinitely, listing and commenting on plants that are easily grown in gardens in my region, and from there on west and south for many hundred miles. Most of these plants I have grown, or am now growing in my garden, next to more sophisticated cousins from Europe, or Asia. But it would be more fun if you would sit down and try to dope out an invitation list of the wild things that are available in your own neck of the woods, be it West, South, North or East.

And lest I be misunderstood, let me make it clear at this point that I am *not* proposing that you go out in the woods and dig up all these things, either with or without permission, or that you boycott your regular nurseryman or seed dealer, or even consider the thought of trying to do without such imported things as are available. It would be the height of stupidity for me to do so and equally foolish for anyone to heed my advice if I did. In the first place, unless you are in a favored locality or own a woodland or other wild land, or have access to one owned by another, it would be impossible for you to collect all these things. Furthermore, sometimes you can save time, and trouble and get better results by buying them from one of the numerous dealers who handle them. Furthermore, we do not want to tear our gardens all apart just to introduce native plants.

Rather, I would suggest setting aside a part of the yard or garden as a native area—not necessarily a wild garden either, but a corner or border where an All-American grouping could be made of plants that are naturally associated with one another, or which blend together gracefully.

If you are just planting your place, I would

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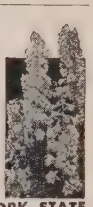

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urge that you "go native" in a section of it, favoring, of course, American plants suited to your climate, soil and location whenever possible, but not at the expense of trying to purge all the worthwhile things of foreign origin into exile.

If I lived farther south, I would naturally favor more heavily such glamorous beauties as the magnolias, jessamine and hollies. In the cooler regions of the North, I would have the woodland nymphs such as trailing arbutus, and the balsam fir and American yew.

In the prairie states I'd take those things that withstand the burning heat of summer and the zero cold of winter, the Kansas gayfeather, cammassia, cone flowers, and evening primroses, to name but a few of the obvious ones. The Pacific Coast has a wealth of material suited to various climatic zones ranging from high alpine to the below-sea-level blast furnace of Death Valley.

From California come such gay charmers as the California poppy, and more rare, but becoming better known in the East, the lovely tribe of *Calochortus,* of which there are forty or fifty species, the best-known one being the so-called Mariposa tulips. The latter are quite hardy as far north as Montreal, according to Carl Purdy, the specialist in natives at Ukiah, Utah. They do not require protection either, if they are planted in well-drained sandy soil, without much organic matter. These beautiful bulbous plants only faintly resemble tulips, but they are colorful, gay and altogether worth while, as are also their cousins the globe and star tulips.

From the Pacific Coast come also a whole bevy of beauties in the dog's-tooth violet group, *Erythronium.* These are larger and finer than our modest dog's tooth of the East, and range in color from pure white to yellow, lavender and rose-pink. They naturalize well in the woods in the East or anywhere else where conditions are similar to their native habitat, the only precaution necessary being to see that they do not become matted down with leaves.

We could go on and on—but there's no space and no point in so doing. Every region has beauties of its own to offer from the wilds to supplement the cultivated garden favorites for local gardeners, as well as for those living many miles away.

Wild Flower Garden

In his spare time, and with what money he can spare, Frank Thrine of Batesville, Indiana, writes us that he is trying to develop a wild flower preserve to be made available to wild flower lovers who have no space or time for their own garden. He says he would appreciate any plants or seeds hardy to southeastern Indiana, and any advice.

Silver Anniversary

For a quarter of a century Mrs. Charles Cyrus Marshall has been active in conservation work, fighting the good fight for the protection of National Parks and in other fields. She will be honored upon the silver anniversary of this service through the presentation of a commemorative medal at a Conservation Day observance to be held under the auspices of the National Life Conservation Society at the Waldorf Astoria in New York on Thursday afternoon, April 3. Invitation is extended to all interested in conservation to attend this meeting, at which an appropriate program will be presented.

NATURE IN PRINT

As a convenience to readers the books reviewed in the pages of Nature Magazine may be ordered through the book department of the American Nature Association, 1214 16th St., Washington, D. C.

(Continued from page 183)

us the pressing problem of how to reconcile the access of the public to cliff lands with the preservation of natural beauty on which the benefit of their scenery depends." Although the setting is different, how familiar this problem is even in our own brave new world, and how encouraging, as examples, are Mr. Cornish's donations of lands and the work of his writing even though they come from across an ocean.

Mr. Cornish expresses the opinion that it is important for those interested in preserving scenery "to do what we can to kindle the historic sense as well as to stimulate the feeling for natural beauty." There could certainly be no better response to this need in this country than the Rivers of America series being currently published by Farrar and Rinehart. Mr. Cornish's observations make these river books seem more important than before to those interested in the out-of-doors. Harry Emerson Wildes' *The Delaware,* for example, does not follow nearly as faithfully the course of the title stream as does Clyde Brion Davis's *The Arkansas,* yet they both certainly "kindle the historic sense."

No one who has read Mr. Wildes' always interesting and often exciting collection of history and folklore can look on the Delaware without a higher appreciation of the river, as well as a more intimate remembrance of such widely different characters as Benjamin Franklin and John Fitch. Delving into the past has also added items of particular interest to conservationists; namely, the "great fish fight" of two centuries ago on the Schuylkill, and the editorial comment of the Salem *Messenger* on politics more than a century ago: "How silly it is to persevere and suffer through all the torturing rains of anxious hopes and glory just to attain the privilege of exposure to public opinion and to say 'Aye' to a proposition to dig a ditch through a salt marsh and to say 'Nay' to a petition for a law to preserve oyster beds."

The Arkansas, I believe, is one of the ideal books of this Rivers of America series—a book that follows the stream faithfully from the Rocky Mountains, through the plains and the Ozarks, to the Mississippi. Mr. Davis reconstructs through exciting incident the rip-roaring pioneer days and sketches the ways of living of the peoples along the Arkansas today, with color and validity, and yet succeeds in keeping the readers conscious that they are following a great river.

Bird Field Key

A Field Key to Our Common Birds. By Irene T. Rorimer. Cleveland. The Cleveland Museum of Natural History. 1940. 160 pages, with illustrations in color and black and white by Roger Tory Peterson. $1.50.

Here is a splendid pocket key for the bird student. It supplies a simple formula for use in observing our common birds in the field. It is primarily for the region of Lake Erie and adjacent territory. Mr. Peterson's illustrations are splendidly reproduced, and, although they are small, have retained their value far better than is usual with relatively small-sized illustrations.

John Kieran, Naturalist

John Kieran's Nature Notes. By John Kieran. New York: Doubleday, Doran. 1941. 112 pages. Illustrated by Fritz Kredel. $2.

Known to many as the author of the most erudite sport column in America, and to his friends as a naturalist, poet, Shakespearean authority and possessor of a memory that is a storehouse of information of amazing catholicity, John Kieran has become a national celebrity through that popular radio program, "Information, Please!" Stumping this expert with Nature questions has been virtually impossible, so far as we can recall (although the questions we have submitted have gone into the waste basket), and Mr. Kieran's answers are always delightful. He does not, we gather, make any pretense to being a systematic naturalist, but he loves the outdoors as a sensitive, keen and close observer of its beauties and charm. It was natural and inevitable, then, that some publisher should seek to capture John Kieran, Naturalist, and get him between the covers of a book. Colonel Theodore Roosevelt, an ink-stained laborer for Doubleday, Doran, succeeded in doing this, and the result is a charming little book entitled *John Kieran's Nature Notes.* It is made up of a half-hundred little word vignettes of Nature, varied and without plan or sequence. You'll love them.

Civic Annual

American Planning and Civic Annual. Edited by Harlean James. Washington, D. C. The American Planning and Civic Association. 1940. 278 pages. $3.

Within the pages of this valuable annual publication is found a record of civic advance in the fields of planning, parks, housing and neighborhood improvement. Also it includes the principal papers delivered at the 1940 meetings of the National Conference on Planning and the National Conference on State Parks.

Photography

Photographing Children. By W. Suschitzky. New York. The Studio Publications, Inc. 1941. 80 pages, with illustrations and diagrams. $3.50.

The title is descriptive of this book on a specialized field of photography. The author draws upon experience to produce a helpful "how to do it" text.

Pan American

The Protection of Nature in the Americas by Wallace W. Atwood is an interesting compilation of information on the spread of the conservation thought in this hemisphere. It is published by the Pan American Institute of Geography and History.

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HALF-A-MILLION WHITE IBISES

(Continued from page 220)

any moment as we swung this way and that. I felt that somehow I should be Bill Finley and Howard Cleaves and Captain Knight all in one, and still not be quite up to the job. Certainly the opportunity was there. Florida redwings showed their marvellous red epaulets over their astonishingly deep nests woven of raffia-like dry rushes. Purple gallinules skittered around over the lily pads, vividly light-blue, greenish-blue, boisterously purple, dream chickens if ever there were such. Anhingas, otherwise water-turkeys or snake-birds, soared like long-necked, pointed-billed, black hawks, or dived and stuck only their long necks and pointed heads above water, looking singularly like watching snakes. Their young on the nests are a beautiful, buffy-tan color. Great blues nested on the crowns of the palmettos, right in the middle of the feather duster and only in small groups. The lesser herons—the egrets, the little blues, the greens and the Louisiana—are clannish and tended to occupy separate portions of the rookery. We found them here or there in numbers, but not as a rule mingling with the other species. But the white ibises, probably because of their enormous numbers, were everywhere, flashing flocks of purest white spouting from the trees, whitening their tops in the distance, sweeping down like squalls of huge-flaked, purest snow where no snow could ever be, making eerie magic in the sun-drenched steaming swamp.

Well, it was a wonderful day, but at last Alec push-poled us out of the massed, clogging vegetation of water lettuce and hyacinths, bonnets, bulrushes ten feet tall, button-bush and elder and dwarfed willows, into more open water where the St. Johns seeps northward and where the kicker could again kick us merrily along toward the narrow ditch to the great palmetto grove of Turtle Mound. It was twenty miles and two hours of bumping, careening, mud-plunging passage through endless prairie back to the restfulness of Art's camp—but it had been worth it.

Night descended in peace on the little separate guest room of the camp. It is set on posts so that possible opossums and probable water moccasins cannot climb into it. Its heavy screens were well fitted to keep out probing hordes of big-billed everglades mosquitos. The quiet of the deep wilderness was there. No radio squalled, no automobile horns honked, no trucks rattled and clattered. But there were other sounds that seemed to blend with the quiet and did not disturb it. All night the red-striped, black-backed rain crickets clinked quartz pebbles together, musically—it sounds like that, anyway—a thousand acres of them. Here and there the bullfrogs grunted, quite like contented razorbacks. But always behind and beyond this sound were the voices of other frogs—the Eifflers say they are frogs—a blended, clanking cacophony as of many distant barnyards full of hawk-watching guinea hens. You do not hear them near. They are always distant, and, strangely enough, these, too, blend into a not displeasing night symphony.

Then there are the limpkins. Art says they were in full cry in February and March. We heard them only occasionally at that, which was a good idea. The limpkin is a heron-like bird some two feet long that was born with a pain in his name and voices it. He is known

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as the "crying bird". "A-e-e-e-ow" he says, something like a baby with the colic; something like a love-lorn cat; more like a limpkin. Somehow even the limpkin's voice did not disturb the peace of the prairie. It seemed merely to accentuate it. Last of all, calling to slumber, was the southern whippoorwill, the chuck-will's-widow. He says it plainly but with something of a musical chuckle in it. Compared to our northern whippoorwill, he drawls. He sat on the roof of the camp, and to his clucking call we dropped off into a deep sleep that lasted until the red bird shouted "What cheer! What cheer! What cheer!" to the rattle of the trade wind in the palmettos at full dawn.

THE SCHOOL PAGE

(Continued from page 228)

teachers have been too afraid to get their feet damp to get out and find what a marsh has to offer. What the boys in their classes have found during their trapping experiences are more foreign to the teachers than what the Eskimo children do, or are reported to do, to a piece of seal hide with their teeth. Is this fair? I doubt very much if it is the children who object to studying marshes, and so I do not feel that it is to the children we should look for a more intelligent behavior. True, it is probable that in a marsh the children would turn out to be the teachers and the teachers the pupils, but there should be nothing wrong in that once in a while. There is nothing that is more likely to establish truly friendly, cooperative relations between pupil and teacher than that which accompanies trying to pull each other out of the mud. The marsh, then, is a valuable socializing element in the school program if it is used well.

On a trip through a marsh someone may step on a clump of sedges. It topples to one side spilling the stepper into the water. Why does it tip over? Why is it narrower at the base than at the top? Don't look for the answer in the books. You will not find it there because ordinarily they do not deal with such homely, practical, universal problems. Do not worry if you get a little wet. Look over that tussock. In all probability you will find that it is the work of a sedge, some ants and some mice. What do the ants do to help in the construction? Why do the mice seek such a place for their activities? How do the mice prevent the tussock from establishing a broad base? And where does the sedge come into the picture so far as the ants and the mice are concerned? Well, you will have to find the answer for yourselves. It's there for you to read in almost any marsh the country over. If you cannot find the answer I might help you, but should I tell you here I would prove to you how poor a teacher I am. Go to the marsh school for your answer. It is there for you to find.

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LADYBIRD ASSEMBLAGE

By HELEN CHANDLER BIXBY

When hiking along the banks of the Little Sandy River, near Mount Hood, Oregon, I made a most interesting discovery. All along the river, at intervals, I would notice ten or more rusty-colored boulders. I paid little attention to them at first, but finally became curious as to the rock formation and stopped to examine the rocks a little closer. I put my hand on the rock to feel it and found it entirely covered with ladybird beetles.

I watched this mass formation of beetles for some time. There was little activity. A few on the outer edge moved a little. It was a rare and beautiful sight. I was amazed at seeing so many ladybirds at one time. I hated to go on but knew that the automobile was waiting for me and that I had to leave.

However, I did walk just a little farther and there found another group of rusty castles. There they were again, the boulders covered with little bodies, just as before. I had no idea that there were that many ladybirds in the whole state.

I had to leave the Little Sandy and cut through the woods to the automobile, but have been wondering how many more ladybirds I would have discovered. They must have been having a little "Get-together" before the long hibernation period began.

The surviving adults, after hibernation, will return to the serious business of egg laying. They place their eggs on the under side of leaves that are inhabited by aphis. Both the adult and larva feed chiefly on aphis so they are very beneficial to agriculturists.

The ladybirds that I handled emitted a yellowish fluid that had a disagreeable smell. Ladybirds occurring in great numbers were regarded with superstition years ago, but now that people have been educated as to the value of the ladybird it is a welcome, unharmed visitor.

Gila Monster

Records of gila monsters laying eggs in captivity seem to be rare but the Hershey Zoo at Hershey, Pennsylvania, boasts such an event. The eggs laid were soft-shelled, two and one-half inches long and one and one-half inches wide. In Nature the reptile, the only poisonous lizard in the United States, usually lays about a dozen eggs in a hole in the sand, covering them with sand to a depth of three to five inches. The young lizards hatch in about a month and are about four inches long at birth, immediately shifting for themselves.

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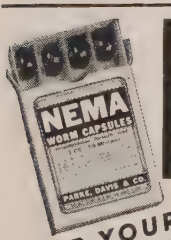

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IN BEHALF OF DOVES

Public Sentiment for Closed Season in 1941 Is Asked

Under this heading the Chattanooga *Times*, in a late November issue, published a letter from Mr. Conner. Jacob T. Cremer, Sports and Wildlife writer for the *Times* has concluded that the slaughter of the mourning dove has progressed beyond the point of reason and safety. For years we have had the same conviction, and we are glad to call to the attention of our readers the fact that the gentle and beautiful dove is gaining friends. It is our hope that those interested will help Mr. Cremer and other friends of the persecuted in the campaign for better treatment.

To the Chattanooga *Times:*

For the past twelve years I have been writing to the *Times* protesting the killing of the mourning dove. A decade ago, doves were being killed in the East Brainerd and Tyner sections by the thousands by thoughtless hunters.

Needless to say the doves are so scarce in this section that very few remain to be killed. Just what sport there is in killing a bird as valuable and harmless as the dove is more than I can comprehend. Yet the Federal Migratory Game Commission allows hunting of the bird to accommodate less than one-half of one percent of the public, under conditions that amount to butchery. Very often twenty-five or thirty men will surround one field, where not more than four or five should be allowed to hunt.

The largest number of doves of which I have any knowledge this season was a flock of probably 500 on a field near New Harrison. There were so many hunters on this field that one man told me it looked like a used-car dealer's lot.

One dove hunter told me that of all the numerous times he had hunted, he had never seen a Federal or State officer on the grounds to check law violations.

Where open seasons are allowed on game there should be a sufficient number of officers to enforce, and of laws to conserve. The present dove regulation is wholly inadequate to preserve the dove. If public sentiment would assert itself there would be a closed season for 1941.

Chattanooga JESSE P. CONNER

AT A LOON NEST

By Marjorie B. Woodman

Up in the northern lake lands of Ontario, the common loon is one of our most frequent summer inhabitants, yet little seems to have been written about it, especially about its life during the weeks spent in the far north raising the young ones.

My home is on an island in Lake Temagami in northern Ontario, where I have been privileged to study the bird life in that virgin land for many summers and a few winters.

Four years ago I witnessed a young loon hatching, and realized that the details surely had not often been observed. Since then I have described my observations to ornithologists.

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In each case it seemed to be the only first-hand description they had ever gotten. So, I am certain it will be both instructive and interesting to bird lovers everywhere.

My sisters and I located the loon's nest in a deep, well-protected cove leading in from a main arm of the lake. It was a jumble of small sticks and grass that seemed more like a mass that had been washed up on shore than a nest constructed by a bird. It was placed on a large, flat, shelving rock and was so close to the lake's edge that the lower part actually rested in the water. It was flat and shapeless. In it were two dark-brown eggs about the size of those of a goose.

After finding the nest we visited it on an average of one or two times a day. We approached it each time by canoe but could never find the old loon on it. Either she would be swimming about at a safe distance uttering her highly-pitched, nervous cry, or would have taken off and be flying back and forth above us as we neared the nest. In spite of our frequent visits she never gave up the idea of hatching those eggs.

It was late in the afternoon several days after we first began watching the eggs that the event we had so hoped we might observe happened. The old loon was nowhere in sight as we paddled close to the nest, but came over on the wing a few minutes later. She was particularly agitated. Where she had been and why, when such an important event in her family life was taking place, we still cannot understand.

Paddling up close to the nest we could plainly see one of the eggs moving. We sat in our canoe for several minutes before the little loon finally poked his head out of the egg. It did not take him long to work himself out of the shell once that tiny black head appeared. The little fellow was covered with black down. Unlike a baby chicken or duck he did not seem to be able to get on his feet. The most amazing thing was the way he began pushing and pulling himself toward the water almost as soon as he left his shell. Upon reaching the lake he struck out as though he had spent years swimming about. His downy covering was not entirely dry but this did not seem to interfere with his being buoyant.

He came straight to our canoe without the least hesitation. We were afraid to pick him up, as much as we would have liked to, for fear his now much excited parent would have nothing to do with him if she sensed the human taint our hands would impart. Each time one of us would hold our hand in the water with the palm upward and an inch or so under the surface, the diminutive bit of loon life would swim into it and seem perfectly contented to remain there.

His absolute lack of fear amazed us and I am sure we could have continued our delightful game the rest of the afternoon. However, the chance that the old loon might give up in her attempt at getting rid of us and permanently fly away, seemed too great to permit us to remain any longer.

By paddling rapidly we were able to leave our little playmate behind. In a few minutes we saw mother loon coming in for a landing so we felt all would be well with him. On no subsequent visit to the cove could we again find either of the two loons. We had hoped we might watch the young one grow and develop, but its mother seemed to have other ideas, probably born of a complete distrust of her would-be friends.

KEEPING A NATURE RECORD

By J. ELMER RUSSELL

For several years I have kept an annual record of what I have seen in the outdoors. This record is not kept, journal fashion, after the manner of Thoreau, for at the end of the year my less ambitious note-book contains only lists of my observations.

This year, for example, my loose-leaf, pocket-size Nature record has a list of birds seen since January first with the dates seen and the locality, if unusual; followed by lists of butterflies, garden flowers, wild flowers, shrubs, trees, and, in the field of astronomy, a list of constellations, planets and stars.

A recent article on shells in Nature Magazine inspired me to see how many different shells I could find on a visit to the seashore, while a trip through the White Mountains reawakened an interest in ferns.

All this sounds like a superficial and amateurish approach to Nature, and so it is compared with the work of ornithologists like Audubon, botanists like Gray, and literary interpreters like John Burroughs—men whose work I admire. But the outdoors has a welcome, also, for those who are not professional naturalists. A little knowledge of Nature is not a dangerous thing. Any method of Nature observation that sends a person as often as possible into the garden, the fields and the woods is worthwhile. It brings him the enjoyment of the song of a wood thrush, the thrill of discovering a clump of yellow moccasin flowers in a deep forest and the uplift of the first view of Orion in the November evening sky.

The effort to lengthen the lists of what I have seen is a kind of game of solitaire, in which I try to beat my own record. Once in a while the mood of friendly competition arises when I compare my Nature records with those of a friend. But chiefly the zest in my game comes from the desire to have a longer list of birds, or flowers, or trees than I had last year at the same date.

Is not my Nature game a higher form of sport than that of the fisherman who counts the number of trout that have been lured by his flies, or that of the hunter who boasts the count of the ducks or pheasants brought down by his gun? I remember with gratitude the poem of that careful Nature observer, Ralph Waldo Emerson, on "Forbearance":

"Hast thou named all the birds without a gun?
Loved the wood—rose and left it on its stalk?
* * * * * *
O, be my friend, and teach me to be thine!"

ON ONE SHORT WALK

By ESTELLA M. WHITE

Nature certainly offers variety in flowers, trees, ferns and the like all about us. Recently on a short walk along a river bank, a friend and I picked every different blossom we could find, just to see how many different kinds were growing there. To our surprise the count was twenty-nine, and we spent no more than thirty minutes in our ramble!

Among the flowers found were purple-flowering raspberry, Joe Pye weed, red clover, and bouncing bet, all in shades of pink. There were many yellow flowers: sneezeweed, evening primrose, common St. Johnswort, yellow clover, buttercup, goldenrod and jewelweed. Forget-me-not, vervain, self-heal and alfalfa were mostly blue. Those with a combination of colors were many-flowered aster, pentstemon, daisy, nightshade, chamomile, white aster. Queen Anne's lace was especially large and beautiful, and we found one plant that was definitely pink, growing beside the white ones. Yarrow also was abundant, the florets much larger than usual. Other white flowers in our collection were tall anemone or thimbleweed, catnip, tall meadow rue and thoroughwort. Quite an assortment for one river bank to produce.

How much one misses who fails to enjoy the beauty of Nature all around us, and never sees the glory of God's creation, in even such common things as wayside flowers! Truly, "the pity of this world is not its limitations, but ours."

NATURE'S GIFT

By EMORY J. MILTIMORE

Today is here and what a wonderful day it is. The sun shines as brightly now as it ever did before. We should be thankful and take an optimistic view of the free beauties of Nature abounding just everywhere.

This state of the world can be likened to a storm and as such will pass by and we all know that the sun has never failed to come up and shine again after the very worst of storms.

We may lose some things, but not our inalienable right to enjoy the beautiful sunshine, the pure fresh air, the birds of song and Nature's beauties here and there.

Whenever we go on a vacation we do not visit the stock market or a manufacturing plant. The rivers, the lakes and the forests along Nature's highway invite you and you answer their call.

It is there that you forget for the moment the dollar sign and discover that real happiness never was wrapped up in money bags.

We do not need a deed, giving us exclusive title, to the beautiful open spaces of Nature in order to enjoy them.

After a journey into the forest or after a boat ride on a river or lake we enjoy a meal cooked out in the open and wonder why it tastes so good. That meal has a flavor that no chef could ever pour out of a bottle.

Perhaps the good taste comes from the ozone in the forest air or perhaps it is forgotten worries that gives us such good appetites. If so let us spend more time outdoors where the rising sun, the soft music of a waterfall and the silence of the deep forest will ever be a wonder to us all.

Today is here and we can enjoy it if we will. Each and every season Nature paints a changing picture as time quietly moves on and on. The beautiful picture is there for us to behold and Nature's highway, be it a mere path in the forest, or a winding river, will lead us to more health and happiness.

Fechner Memorial

A forest memorial to Robert E. Fechner, forest director of the Civilian Conservation Corps, will be established on the wooded slopes of Massanutten Mountain in Virginia through the dedication of 72,000 acres of National Forest. In the area selected the first CCC camp was established on April 13, 1933. This camp is still in operation on the original site.

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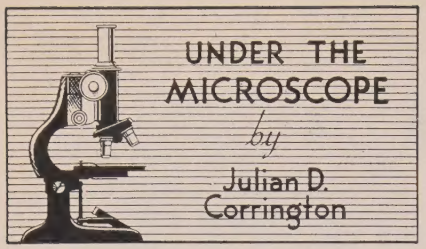


Drawing with the Microscope

Some people love to draw—particularly those with some native talent for art. Others have never given the matter much consideration; still others are certain that they cannot draw at all. It is a fact, however, that anyone can make the simple outline type of reproduction required of students in science courses. Getting outlines and proportions correctly represented is a matter of attention and learning to see what you are looking at, not one of skill or artistic ability. Perspective, shading and the like are unnecessary.

Drawing with the microscope may be freehand, but accurate drawings are usually made by optical aids and are no more than tracings, and it is this type, readily executed by anyone, that we promised last month to discuss for you in some detail.

The real image of an object under the microscope may be projected horizontally onto a screen, and if a drawing is wanted, a

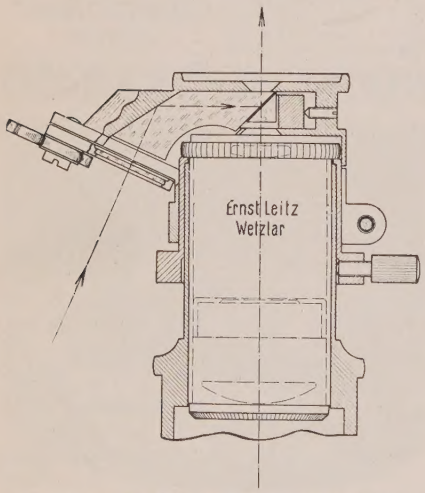
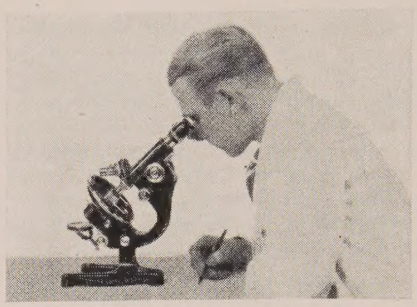


DIAGRAM OF THE PATH OF LIGHT RAYS THROUGH A DRAWING OCULAR (E. LEITZ, INC.)

sheet of suitable paper, tacked to a board, is substituted for the screen. If located 250 mm. from the eyepoint of the ocular, as pointed out in our article last month on micrometry, the size of the image will be exactly the same as that seen through the microscope in the ordinary visual manner, and hence magnifications can be computed with ease. However, where amount of enlargement is of no importance, any distance can be used, and the screen is generally placed at that distance giving the most appropriate size of object for the dimensions of the paper used.

It is not easy to trace a drawing on an upright sheet, though, and better results as well as greater comfort are secured by using a mirror attached to the eyepiece, tilted at 45°, to project the image downward onto paper in horizontal position on the table. A 45° prism does the same thing and one of our illustrations shows a simple home-made device for this purpose, a small prism fastened to the eyepiece with a bit of plasticene. Any form of microprojection apparatus may be used for making drawings by this same arrangement.

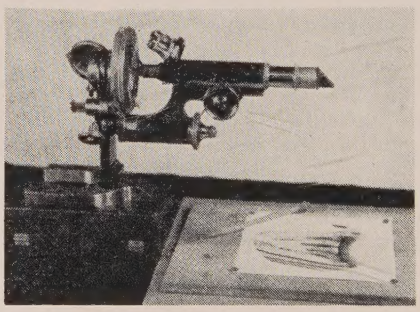
This projection method is probably the



THE DRAWING OCULAR IN USE (E. LEITZ, INC.)

best for low power reproductions of larger objects, but has certain disadvantages. To observe fine detail it is necessary to eliminate all outside light that fogs the image, and hence the work must be carried on at night in a completely darkened room, and the drawing paper shielded from all rays from the illuminant that do not come through the microscope. Or the operator must rig up a booth or drawing box for daytime work, protected from outside light by curtains or a hood.

A different principle is met with in the camera lucida, the simplest form of which is seen in the drawing ocular. As explained by

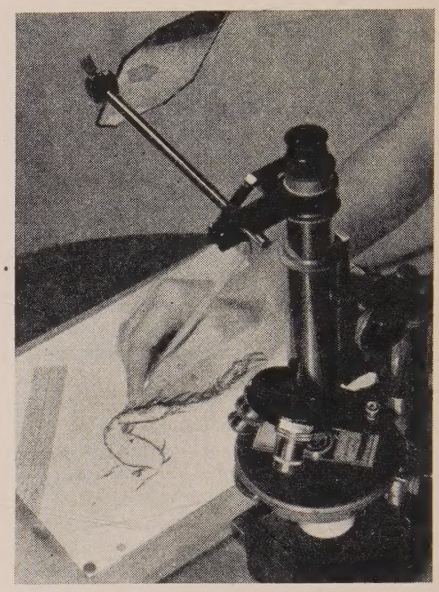


PROJECTION METHOD, USING A PRISM OVER THE EYEPIECE. LIGHT SOURCE NOT SHOWN

an accompanying diagram, light rays from the object traverse the ocular and reach the eye as usual, passing through a prism. Other light rays, reflected by the drawing paper on the table beside the microscope, enter through a side piece and are twice reflected by prisms so that they join those coming from the object, and are perceived by the eye. Hence the images of the drawing paper and object are superposed, and as one looks into this ocular, the pencil seems to be moving about among the parts of the object and a direct tracing of structures is a simple matter.

Another illustration shows this eyepiece in use and it will be observed that the microscope is inclined so that the side piece of the ocular is directed straight downward toward a sheet of paper situated between observer and foot of microscope. If this angle is correct there will be no distortion of the image.

The finest form of the Abbe camera lucida employs a tilting mirror held out from the ocular by an adjustable arm, together with a prism in a housing over the eyepiece. Here too the observer receives simultaneous images of object and drawing paper. The chief additional advantage of this type of instrument lies in the fact that tinted glasses in rotating



MAKING A DRAWING WITH THE ABBE CAMERA LUCIDA

discs are placed in the pathway of each of the images. By turning each of these in succession the operator is enabled to equalize the amount of light received from the two sources, thereby rendering both pencil and object of similar distinctness. Without this feature the light from the object may be so much brighter than that from the drawing paper that the image of the pencil is vague and indistinct; or the opposite condition may obtain, resulting in a shadowy object and boldly seen pencil.

The *amount* of light used for camera lucida drawings does not matter, so long as illumination from paper and object are of approximately equal intensity, and hence such drawings may be executed in the full glare of daylight. Finer detail with high magnification is more readily obtained than by the projection method.

Photography supplements but does not supplant drawing. A photograph reproduces everything. Often there is such a wealth of detail in the subject that it is necessary to suppress or subdue certain parts while emphasizing others, if the object of the reproduction is to point out only particular items to the reader. When making recordings, then, whether for publication or only for personal use, one has the option of photomicrography or drawings, and sometimes one, sometimes the other, will prove best for the material and purpose of the case at hand.

Historical Outline

Antoni van Leeuwenhoek, the great Dutch amateur microscopist, was one of the most interesting personalities in the whole history of science. In evaluating his relative worth, most writers have stressed his lack of a formal university education, resulting in an absence of any planned program of work. He jumped from one subject to another, seldom following out any particular line to a logical conclusion. On a single plate of drawings, for

example, he showed fingerprints, pores and cuticular scales from the human hand along with the record of the classical discovery of bacteria, with drawings of all three types of these organisms, the spheres, rods and spirals.

On the other hand the quality of his work was so excellent that he cannot be considered as a mere dabbler. Often he demonstrated a remarkable insight regarding the significance and importance of his discoveries, and it is generally agreed that his powers of discernment were most extraordinary. No one else has ever been able to see so much through his single lenses as the man who made them. Having had no teacher, he preferred to go his way alone thereafter and was at times vain of his accomplishments and jealous of his lens-grinding secrets. One biographical note states that he never took a student under his wing, while another refers to his friendly collaboration with Dr. Ham in the discovery of spermatozoa. The older amateur gave full credit to the young professional for this important observation, then went on to investigate the subject in insects, fishes, birds and mammals, with true scientific method and diligence, and was the first to reach the important conclusion that these "animalcules", thought by Ham to result from putrefaction, were actually the male germ cells.

As we shall see in greater detail later, Leeuwenhoek was no intellectual giant in the matter of abstract thinking, but he did possess shrewdness and tenacity and formed definite convictions. As regards the two great biological problems of his day, he took the track since proved to be wrong in one case, but stoutly upheld the modern view in the other. Thus he believed he could see a miniature man or homunculus in the sperm cell and so became a Preformationist, advocating a now abandoned theory, but his work on the egg cells of many forms of animals led him to deny the occurrence of spontaneous generation, then a lively topic of debate, affirmed by many of his contemporaries and even clung to down into the middle of the nineteenth century by bitter-enders.

Possessed of an inquiring mind, exceptional eyesight, sufficient funds and ample time, this long-lived Hollander devoted himself to lens grinding and the manufacture of microscopes of his own design, but rightly regarded his instruments, beautifully and carefully executed though they were, as only a means to an end, and became the first person to turn these lenses in every direction, exploring and opening up to an astonished humanity the whole realm of the invisible. How we must envy his extraordinary opportunities today!

It was Leeuwenhoek, as we have indicated, who first discovered and drew and described bacteria—not only the group as a whole, but the three great morphological types now called bacilli, cocci and spirilla (1683); the protozoa (1675); sperm cells (1677); red blood corpuscles in circulating blood (1686); and a great array of other and miscellaneous biological observations. Working with aphids (plant lice) Leeuwenhoek worked out the details of parthenogenesis or virgin birth—development of the egg into an adult without fertilization, and described the young within the body of the unfertilized female, a truly amazing and advanced accomplishment for his day. He discovered yeast cells and worked on the microscopic structure of wood. In histology, besides his epochal studies of circulation, he was the first to announce the structure of bone, the striations of skeletal muscle, the syncytial or branching nature of cardiac muscle, and the composition of the lens of the eye. In embryology he worked on many and varied types of animals and discovered that clams reproduce by means of eggs. His contributions to invertebrate zoology, in addition to the protozoa, also included the discovery of rotifers. In fact, he was a pioneer in every field and is today honored as the father of many of our most fruitful lines of investigation. One of the most recent texts of bacteriology we have reviewed displays his portrait as a frontispiece.

Leeuwenhoek was not, of course, the only person of his generation to use the microscope, and we shall tell in future installments of the monumental achievements of the Italian, Malpighi; the Englishmen, Grew and Hooke; and of Leeuwenhoek's fellow countryman, Swammerdam. We must also take account of the rise at this period of scientific societies and their important rôle of fostering scientific research and disseminating the results by means of their publications.

Trade Notes

If you have read our feature article this month you may have become interested in the idea of making drawings in connection with your work. Or maybe you are interested in drawing anyway. Be that as it may, we have been saving up a book review for just this occasion—an exceptionally well done piece of writing and pen work by Professor Justus F. Mueller of Syracuse University. The author is primarily a scientist (zoology, parasitology) and only secondarily an artist, though a mighty good one, and we believe this accounts in large measure for the skillful, exact, yet entertaining way in which he puts across his subject. The approach is direct and brief. In *A Manual of Drawing for Science Students,* there are 122 pages, including some 360 drawings and sketches, by means of which the reader learns the general principles of freehand drawing as applied to scientific materials, as well as the essentials of perspective, projection, shading, optical and mechanical aids, and how to make drawings for reproduction. The entire matter is made to appear so simple that the reader itches to take paper and pencil and get at it. Highly recommended for all who have any yen for drawing, and a must book for those preparing a thesis or other material for publication. A fascinating account of the career and accomplishments of the author in both science and art appears in the February issue of Ward's *Natural Science Bulletin* with two portraits. Farrar & Rinehart, Inc., 232 Madison Ave., New York City. $1.75.

Kendall's *Microscopic Anatomy of Vertebrates* has been issued in a completely revised second edition. This is a concisely written comparative histology covering all tissues and organ systems, profusely illustrated. Generalities for a given system are first discussed, followed by treatment of differences encountered in the several classes of vertebrates. Histology is apt to make rather dry reading from the wealth of factual detail involved, but Professor Kendall contrives to write in an interesting and stimulating manner, bringing in sufficient related material from embryology and physiology to make the subject live and dynamic. Pp. 342; figs. 197. Lea & Febi-

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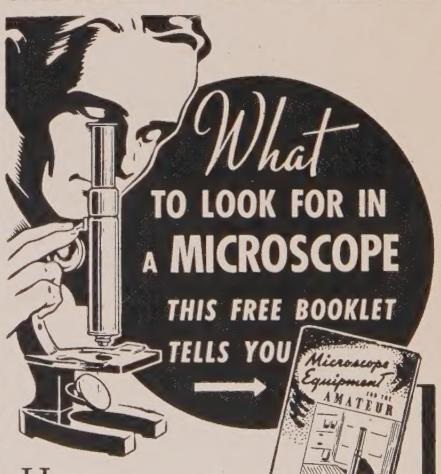

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Leaflet #1 is entitled "How to Make an Insect Collection" and takes up collecting, equipment, killing, mounting, labeling and preserving. #2 is "Preserving Zoological Specimens", with a comprehensive table showing type of animal, where found, special collecting devices, how to kill, fixatives and preservatives. #3 is "Preserving Botanical Specimens" and considers preserving for laboratory study, for microscopic examination and for display purposes.

Invaluable for all teachers of biology, these leaflets will fill an equally important need for the amateur working alone.

Would you like to make experimental studies of your own in modern natural history, otherwise known as ecology? If so, you need the stimulating suggestions and definite directions of *A Laboratory Introduction to Animal Ecology and Taxonomy,* by Park, Allee and Shelford. How to identify the animals you collect; experiments to perform on living animals to test their behavior and reactions to many forms of stimuli and environmental conditions; what sorts of microscopical studies to make on living hydra, planaria, parasites, worms, microcrustacea, rotifers and many others; a glossary of terms, taxonomic keys, and a detailed bibliography are all to be found within the 272 pages of this attractive volume, by the outstanding authorities in this field. The University of Chicago Press, 5750 Ellis Ave., Chicago. $2.00.

National Association of Biology Teachers

At the recent Christmas holiday meetings of the American Association for the Advancement of Science, in Philadelphia, we had the pleasure of meeting for a short period with the Executive Board of the National Association of Biology Teachers and explaining the nature and purposes of our American Society of Amateur Microscopists. On the spot we were voted an affiliation for the A.S.A.M. with the N.A.B.T., the two organizations to work together in the advancement of common aims.

The journal published by this organization is a remarkably well edited and printed magazine, issued eight times during the school year, from October to May, *The American Biology Teacher.* Membership is only $1.00 per year, including subscription to this periodical. Articles are concerned with teaching aids and methods, curriculum, projects, interests, book reviews and miscellaneous items, all of which we found valuable and instructive. The secretary, to whom memberships should be addressed, is P. K. Houdek, Robinson, Illinois.

In the November, 1940, issue, we were especially pleased to note that as a result of a survey conducted by J. W. Galbreath in the Senior High School of East St. Louis, Illinois, microscopy was ranked first in interest out of 33 possible topics by students beginning the biology course. The subject was taught first, yet in spite of a wealth of other subjects taught thereafter, and remembering that recency is an important factor in any such questionnaire, microscopic study dropped only to third place when the survey was repeated at the end of the year. Its average rank was the equal of any and superior to all but one other field.

In this same issue, A.S.A.M. member, Rev. John W. Baechle, St. Joseph's College, Collegeville, Indiana, whose work readers of the A.S.A.M. *Bulletin* will recall, contributed an illustrated article on "Photomicrography Without a Microscope or Camera" that we found most interesting.

THE AMERICAN SOCIETY OF AMATEUR MICROSCOPISTS

A Review of Progress to Date

Founding: the A.S.A.M. grew out of correspondence resulting from inauguration of this Department, *Under the Microscope,* in NATURE MAGAZINE, with the August, 1937, issue. So favorable was the response to questionnaires we sent out that the Society was launched in March, 1939, and has shown a steady and healthy growth each month thereafter. The present membership is 825, representing 43 States, 3 Territories, 6 Canadian Provinces and 3 foreign countries. The foreign memberships would have been much greater by this time had it not been for the war.

Officers: President, Dr. Simon Henry Gage, Professor Emeritus of Histology and Embryology, Cornell University. Address, Stimson Hall, Ithaca, N. Y. Author of "The Microscope." Permanent Secretary, Dr. Julian D. Corrington, Professor of Biology, Washington College. Address, 118 Water St., Chestertown, Md. Author of "Adventures With the Microscope."

Publications: the official organ is NATURE MAGAZINE, in which a column of A.S.A.M. news appears monthly. The Society has issued four numbers of its *Bulletin* and one special booklet, "Organizing and Maintaining a Chapter." A very handsome official emblem has been adopted and appears on the certificate of membership awarded each member as well as on charters granted to chapters. Publications office: Boyers M. Clark, Box 105, Elkins, W. Va.

Affiliations: the Society is affiliated with the National Association of Biology Teachers and with the State Microscopical Society of Illinois (Chicago).

Chapters: at the present writing ten chapters have been officially established and are functioning actively as local microscope clubs, as follows: Alpha—The Janseen Chapter, Allentown, Pa. President, Marlowe W. Hartung, Jr., 1003½ Tilghman St.

Beta—The Leeuwenhoek Chapter, Johnsonburg, Pa. Secretary, Flora Rhines, 614 Third Ave.

Gamma—The Seattle Chapter, Seattle, Washington. Secretary, Richard Peterson, 3931 Meridian Ave.

Delta—The Bangor Chapter, Bangor, Pa. President, Sidney Monas, R. D. #3.

Epsilon—The Indianapolis Chapter, Indianapolis, Ind. Secretary, H. Merrill Underwood, 1215 Markwood Ave.

Zeta—The Edmonton Chapter, Edmonton, Alberta, Canada. Secretary, M. A. Bomerlan, 11334 89th St.

Eta—The Huygenian Chapter, Boston, Mass. Secretary, R. C. Sisson, 1426 Commonwealth Ave., Brighton, Mass.

Theta—The Rafinesque Chapter, Lexington, Ky. President, Z. S. Gierlach, Transylvania College, Lexington.

Iota—The Washington Chapter, Washington, D. C. President, J. R. Clough, 15A, Bates St., N. W.

Kappa—The Brooklyn Chapter, Brooklyn, N. Y. President, Sidney Alexander, 1437 52nd St.

Chapters Forming:

Angwin, Cal., Prof. Joseph G. Fallon, Dept. of Biological Science, Pacific Union College.

Buffalo, N. Y., J. H. Small, 234 Tacoma Ave. or Spencer Lens Co.

Chester, Pa., E. J. Kestel, 1100 Potter St.

Croton-on-Hudson, N. Y., Mrs. Frances H. Elwyn, Mt. Airy Road.

Detroit, Mich., W. L. Foster, 1108 Withington, Ferndale, Mich.

Hartford, Conn., see West Hartford.

Jersey City, N. J., K. M. Lindsey, 315 Sherman Ave.

Kohler, Wis., C. C. Shepard, 402 Summit Road.

Lowell, Mass., S. L. Speronis, 121 Powell St.

Milwaukee, Wis., E. N. Silber, 3019 N. 45th St., and A. A. Winterkorn, 3602 W. Linden Place.

Moscow, Ida., Ted Bank, Jr., 820 West C St.

Muenster, Sask., Canada, Rev. P. E. Kuehne, Biology Dept., St. Peter's College.

New York City. Henry Franklin, 1344 Lyman Place. Saul Gordon, 10 Cooper St. George Schwartz, 8447-118th St., Richmond Hill, Queens. Simon Truman, 2538 Cruger Ave., Bronx.

Oakland, Cal., Mildred Marshak, 263 Athol Ave.

Philadelphia, Pa., C. H. Chappell, 4027 N. Darien St.

Pittsburgh, Pa., Rev. J. F. Virgin, 3306 Fifth Ave.

Racine, Wis., Clyde Kratochvil, 2048 Rapids Drive.

Rochester, N. Y., J. P. Gast, 592 Hayward Ave.

Salt Lake City, U., E. J. Roscoe, 2364 South Ninth East.

San Francisco, Cal., T. S. Carley, 111 Fairlawn Drive, Berkeley.

Toronto, Ont., Canada, R. R. File, Central Technical School.

Tring (via Marwayne), Alta., Canada, D. H. Harrington.

Waynesburg, Pa., H. F. Schaeffer, 92 S. West St.

West Hartford, Conn., Maurice Bogdonoff, 61 Ledgewood Road.

Winthrop, Mass., Edna M. Fielding, Head, Science Dept., Winthrop Senior H. S.

Yountville, Cal. (Napa Valley), Mrs. W. E. Jordan, P. O. Box 483.

Members residing in or near these communities should get in touch with the organizers named; non-members desirous of joining should first affiliate with the national society.

Qualifications: anyone interested in microscopy may join, of whatever race, creed, age, sex or occupation. Professional microscopists are very welcome. Our present membership is a perfect cross section of American life, with men, women, boys, girls, many nationalities and over 200 different lines of work or interest.

A postcard to the Permanent Secretary will bring information sheets and an application blank. Dues at present, fifty cents per year.